



Search Report

EIC 1700

STIC Database Tracking Number: 1111

To: EUGENIA WANG
Location: REM-6C61
Art Unit: 1795
Thursday, November 01, 2007
Phone: (571) 272-4942
Case Serial Number: 10 / 620675

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Search Notes

Banks, Kendra

241490

From: EUGENIA WANG [eugenia.wang@uspto.gov]
Sent: Thursday, October 25, 2007 5:37 PM
To: STIC-EIC1700
Subject: Database Search Request, Serial Number: 10/620675

Requester: EUGENIA WANG (P/1745)
Art Unit: GROUP ART UNIT 1745
Employee Number: 82927
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Phone Number: (571)272-4942
Mailbox Number:

SCIENTIFIC REFERENCE BR
Sci & Tech Inf. Cntr

OCT 26 RECD**Pat. & T.M. Office**

Case serial number: 10/620675
Class / Subclass(es): 429/33, 306, 314, 30, 317
Earliest Priority Filing Date: 7/15/03
Format preferred for results: Paper
Attachments: No attachment.
Search Topic Information:

The method of claim 1: electrodepositing a polymeric electrolyte on a substrate. Please look for embodiments wherein the substrate is a porous stainless steel. NOTES: (1) The polymeric electrolyte solution embodied in this application is Nafion, FLEMION, DOW XUS (chemically: perfluorinated sulfonic acid, perfluorosulfonate ionomer). (2) Electrodeposition may also be known as: electrodeposition, electroplating, electrophoretic deposition, electrolytic/electrolyte deposition, electrocoating, electrophoretic coating, electrophoretic painting.
Special Instructions and Other Comments:

Jan
10/26/07

> fil hcaplus
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L93 ANSWER 1 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2007:705861 HCAPLUS

DN 147:103937

TI **Electrolytic cell for metal deposition**

IN Sali, Stefano; Guarnuccio, Riccardo; Oldani, Dario; Carrettin, Leonello; Rossi, Paolo

PA Industrie De Nora S.p.A., Italy

SO PCT Int. Appl., 19pp.

CODEN: PTXXD2

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2007071713	A1	20070628	WO 2006-EP69982	20061220
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW			
	RW:	AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			

PRAI IT 2005-MI2420 A 20051220

AB The invention relates to an **electrolytic cell** of vertical cylindrical design provided with a coaxial central anode and tangentially oriented inlet and outlet nozzles in order to establish a spiral upward **electrolyte** flow particularly suitable for the **deposition** of metals starting from **solns.** of medium-low

concentration The cell is of the type equipped with an elastic sleeve mech. forced into the cathode body: the metal is **deposited** on the sleeve which at the end of the **electrolysis** can be extracted from the cathode body together with the **deposit**. The anode consists of a thin-walled metal tube containing an internal metal rod welded thereto and further equipped with a protecting net of plastic material, said anode and said net being resp. directed to prevent the dendrite growth and the possible deformation of the elastic sheet from causing short-circuits. In one preferred embodiment, the internal metal rod of the anode has a length lower than the thin-walled tube.

- CC 72-8 (Electrochemistry)
Section cross-reference(s): 47, 56
- ST **electrolytic cell metal deposition spiral**
upward **electrolyte** flow
- IT **Electrodeposition**
Electrolytic cells
(**electrolytic cell** for metal **deposition**)
- IT Metals, processes
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); FORM (Formation, nonpreparative); PROC (Process)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comp frombody)
- IT Catalysts
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising anode
coated with)
- IT Coating materials
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising anode
coated with catalyst)
- IT Elastic materials
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising elastic sleeve
body)
- IT Cathodes
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising external
cathode body)
- IT Fluoropolymers, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising protecting net
from metal with insulating coatings from)
- IT Flow
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow.)
- IT titanium alloy, base
RL: NUU (Other use, unclassified); USES (Uses)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising protecting net
from)
- IT 7440-02-0, Nickel, processes 7440-48-4, Cobalt, processes 7440-50-8,
Copper, processes 7440-66-6, Zinc, processes
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical
process); FORM (Formation, nonpreparative); PROC (Process)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow)
- IT 12597-68-1, Stainless steel, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**electrolytic cell** for metal **deposition**)

with spiral upward **electrolyte** flow comp frombody)

IT 16833-27-5, Oxide
 RL: CAT (Catalyst use); USES (Uses)
 (electrolytic cell for metal deposition
 with spiral upward **electrolyte** flow comprising anode
 coated with catalyst)

IT 9002-84-0, Polytetrafluoroethylene 9002-86-2,
 Polyvinylchloride 9002-88-4, Polyethylene
 9003-07-0, Polypropylene 24937-79-9, Polyvinylidene
 fluoride
 RL: NUU (Other use, unclassified); USES (Uses)
 (electrolytic cell for metal deposition
 with spiral upward **electrolyte** flow comprising protecting net
 from metal with insulating **coatings** from)

IT 7440-32-6, Titanium, uses
 RL: NUU (Other use, unclassified); USES (Uses)
 (with insulated **coatings**; **electrolytic cell**
 for metal deposition with spiral upward **electrolyte**
 flow comprising protecting net from)

IT 12597-68-1, Stainless steel, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (electrolytic cell for metal deposition
 with spiral upward **electrolyte** flow comp frombody)

RN 12597-68-1 HCAPLUS
 CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 9002-88-4, Polyethylene
 RL: NUU (Other use, unclassified); USES (Uses)
 (electrolytic cell for metal deposition
 with spiral upward **electrolyte** flow comprising protecting net
 from metal with insulating **coatings** from)

RN 9002-88-4 HCAPLUS
 CN Ethene, homopolymer (CA INDEX NAME)

CM 1
 CRN 74-85-1
 CMF C2 H4

H2C=CH2

RETABLE

Referenced Author (RAU)	Year (RKY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Herogueille Yves	1987			US 4643819 A	HCAPLUS
Houseman Kenneth R	1984			US 4440616 A	HCAPLUS
Ponto Gerald R	1996			US 5584975 A	HCAPLUS

L93 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2006:155437 HCAPLUS

DN 144:399880

TI Corrosion inhibition by **Nafion-polyaniline** composite
 films deposited on **stainless steel** in a
 two-step process

AU Sazou, D.; Kosseoglou, D.

CS Department of Chemistry, Aristotle University of Thessaloniki,

- Thessaloniki, 54 124, Greece
- SO Electrochimica Acta (2006), 51(12), 2503-2511
CODEN: ELCAAV; ISSN: 0013-4686
- PB Elsevier B.V.
- DT Journal
- LA English
- AB The inhibition of pitting corrosion of **stainless steel** (SS) is addressed in this paper by using a new type of anticorrosive **coatings** consisting of **Nafion-polyaniline** (PAN) composite films **electrodeposited** on **stainless steel** in a 2-step process. The anticorrosive strategy presented here is based on the interfacial modification of SS with a **Nafion** film, which as a cationic selective membrane prevents chloride ions to reach the **SS surface**. Chloride insertion to the composite **Nafion-PAN** film becomes less likely since **sulfonate** groups of the **Nafion** contribute to the charge compensation of PAN and therefore charge transport processes involve proton expulsion than anion insertion. **Nafion** films were **pre-deposited** at the **surface** of the **SS electrode** and the PAN films were formed on the **SS|Nafion electrode** by cyclic voltammetry in 0.5M H2SO4 solns. containing 0.1M aniline. Open circuit potential and potentiodynamic measurements were used for the evaluation of the corrosion protection properties of the **Nafion-PAN** composites.
- CC 72-6 (Electrochemistry)
- ST Section cross-reference(s): 35, 36, 42, 55
Nafion polyaniline composite anticorrosive coating **stainless steel**; aniline **electrochem** polymn **Nafion** modified **stainless steel**
- IT Composites
(anticorrosive **coatings** from **Nafion-polyaniline** composites on **stainless steel**)
- IT Coating materials
(anticorrosive; **Nafion-polyaniline** composites on **stainless steel**)
- IT Polyamines
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process); USES (Uses)
(**electrochem.** preparation on **stainless steel** and **Nafion-modified stainless steel** in H2SO4 solution and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)
- IT Polymerization
(**electrochem.**, oxidative; of aniline on **stainless steel** and **Nafion-modified stainless steel** in H2SO4 solution and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)
- IT Open circuit potential
(of **Nafion-polyaniline** composites on stainless in H2SO4-NaCl solution)
- IT Electrolytic polarization
(of **Nafion-polyaniline** composites on **stainless steel** in H2SO4-NaCl solution)
- IT 11109-50-5, AISI 304 66796-30-3, **Nafion** 117
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(electrochem. polymerization of aniline on stainless steel and Nafion-modified stainless steel in H2SO4 solution and anticorrosive coatings of Nafion-polyaniline composites on stainless steel)

IT 7664-93-9, Sulfuric acid, uses
 RL: NUU (Other use, unclassified); USES (Uses)
 (electrochem. polymerization of aniline on stainless steel and Nafion-modified stainless steel in H2SO4 solution and anticorrosive coatings of Nafion-polyaniline composites on stainless steel)

IT 62-53-3, Aniline, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (electrochem. polymerization on stainless steel and Nafion-modified stainless steel in H2SO4 solution and anticorrosive coatings of Nafion-polyaniline composites on stainless steel)

IT 25233-30-1P, Polyaniline
 RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process); USES (Uses)
 (electrochem. preparation on stainless steel and Nafion-modified stainless steel in H2SO4 solution and anticorrosive coatings of Nafion-polyaniline composites on stainless steel)

IT 7647-14-5, Sodium chloride, processes
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (open-circuit potential and electrolytic polarization of Nafion-polyaniline composites on stainless steel in H2SO4-NaCl solution)

IT 11109-50-5, AISI 304 66796-30-3, Nafion 117
 RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (electrochem. polymerization of aniline on stainless steel and Nafion-modified stainless steel in H2SO4 solution and anticorrosive coatings of Nafion-polyaniline composites on stainless steel)

RN 11109-50-5 HCAPLUS

CN Iron alloy, base, Fe 66-74, Cr 18.00-20.00, Ni 8.00-10.50, Mn 0-2.00, Si 0-1.00, C 0-0.08, P 0-0.045, S 0-0.030 (UNS S30400) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 74	7439-89-6
Cr	18.00 - 20.00	7440-47-3
Ni	8.00 - 10.50	7440-02-0
Mn	0 - 2.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.08	7440-44-0
P	0 - 0.045	7723-14-0
S	0 - 0.030	7704-34-9

RN 66796-30-3 HCAPLUS
 CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLER

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Ahmad, N	1996	178	103	ISynth Met	HCAPLUS
Alpatova, N	2002	138	1913	IRuss J Electrochem	HCAPLUS
Andreev, V	2001	137	1605	IRuss J Electrochem	HCAPLUS
Barthet, C	1995	1388	135	IJ Electroanal Chem	HCAPLUS
Bernard, M	1999	146	1995	IJ Electrochem Soc	HCAPLUS
Bojinov, M	1999	141	1155?	ICorros Sci	HCAPLUS
Camalet, J	1998	1445	1117	IJ Electroanal Chem	HCAPLUS
Camalet, J	1998	193	1133	ISynth Met	HCAPLUS
Camalet, J	1999	102	1386	ISynth Met	HCAPLUS
Chadrsekhar, P	1999	1	1	IConducting Polymers.	HCAPLUS
Cui, S	1999	105	191	ISynth Met	HCAPLUS
DeBerry, D	1985	132	1022	IJ Electrochem Soc	HCAPLUS
de Souza, S	2001	14	1827	IElectrochem Sol St L	HCAPLUS
Fahlman, M	1997	185	1323	ISynth Met	HCAPLUS
Glerke, T	1981	119	1687	IJ Polym Sci	HCAPLUS
Heitner-Wirquin, C	1996	120	11	IJ Membr Sci	HCAPLUS
Hirai, T	1988	135	1132	IJ Electrochem Soc	HCAPLUS
Kraljic, M	2003	145	1181	ICorros Sci	HCAPLUS
Lou, W	1995	140	1667	IElectrochim Acta	HCAPLUS
MacDiarmid, A	2002	125	111	ISynth Met	HCAPLUS
McAndrew, P	1997	15	17	ITrip	HCAPLUS
Orata, D	1987	109	13574	IJ Am Chem Soc	HCAPLUS
Orata, D	1988	1257	171	IJ Electroanal Chem	HCAPLUS
Patil, S	2004	1225	1204	Appl Surf Sci	HCAPLUS
Porat, Z	1993	140	12501	IJ Electrochem Soc	HCAPLUS
Sazou, D	1997	1429	181	IJ Electroanal Chem	HCAPLUS
Sazou, D	2001	118	1133	ISynth Met	HCAPLUS
Sazou, D	2002	130	145	ISynth Met	HCAPLUS
Sedrics, J	1996	1	1	ICorrosion of Stainle	HCAPLUS
Shim, Y	1990	137	1538	IJ Electrochem Soc	HCAPLUS
Spinks, G	2002	16	157	IJ Sol St Electrochem	HCAPLUS
Spinks, G	2002	16	185	IJ Sol St Electrochem	HCAPLUS
Varela, H	2001	122	1321	ISynth Met	HCAPLUS
Wang, J	2002	132	153	ISynth Met	HCAPLUS
Wei, Y	1989	193	1495	IJ Phys Chem	HCAPLUS
Wessling, B	1994	16	1226	Adv Mater	HCAPLUS
Yue, J	1991	113	12665	IJ Am Chem Soc	HCAPLUS

L93 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2005:408893 HCAPLUS

DN 142:449388

TI System and a method for manufacturing an electrolyte using
electro depositionIN Punsalan, David; Herman, Gregory; Mardilovich,
Peter

PA USA

SO U.S. Pat. Appl. Publ., 13 pp.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PT US 2005098438	Al	20050512	US 2003-705486	20031110 <--

PRAI US 2003-705486 20031110
 AB A method of forming an **electrolyte** includes removably coupling a perimeter support to a temporary **substrate**, and **electrodepositing** an **electrolyte** composite film on the temporary **substrate**.
 IC ICM C25D0009-04
 INCL 205109000
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 36, 72
 ST **manuf polymer electrolyte electrophoretic deposition**
 IT **Polyoxyalkylenes, uses**
 RL: NUU (Other use, unclassified); USES (Uses)
 (fluorine- and sulfo-containing, ionomers;
 manufacturing **electrolyte** using **electrodeposition**)
 IT **Electrodeposition**
 (manufacturing **electrolyte** using)
 IT **Electrolytes**
Electrophoretic deposition
Polymer electrolytes
 (manufacturing **electrolyte** using **electrodeposition**)
 IT **Fuel cells**
 (manufacturing **electrolyte** using **electrodeposition** for)
 IT **Ceramics**
 (manufacturing **electrolyte** using **electrodeposition** for **fuel cell**, comprising)
 IT **Fluoropolymers, uses**
 RL: NUU (Other use, unclassified); USES (Uses)
 (polyoxyalkylene-, sulfo-containing, ionomers
 ; manufacturing **electrolyte** using **electrodeposition**)
 IT **Ionomers**
 RL: NUU (Other use, unclassified); USES (Uses)
 (polyoxyalkylenes, fluorine- and sulfo
 -containing; manufacturing **electrolyte** using **electrodeposition**
)
 IT **Ion exchange membranes**
 (proton; manufacturing **electrolyte** using **electrodeposition**
 for **fuel cell** with)
 IT 7440-02-0, Nickel, uses 12597-68-1, **Stainless steel**, uses
 RL: DEV (Device component use); USES (Uses)
 (temporary **electrode** in manufacturing **electrolyte** using **electrodeposition**)
 IT 12597-68-1, **Stainless steel**, uses
 RL: DEV (Device component use); USES (Uses)
 (temporary **electrode** in manufacturing **electrolyte** using **electrodeposition**)
 RN 12597-68-1 HCAPLUS
 CN **Stainless steel** (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 2005:50884 HCAPLUS
 DN 142:138321
 TI A system and a method for manufacturing a **fuel-cell electrolyte** using **electrodeposition**
 IN Punsalan, David; Mardilovich, Peter; Herman, Gregory S.
 FA Hewlett-Packard Development Company, L.P., USA

SO Eur. Pat. Appl., 17 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1498976	A2	20050119	EP 2004-253574	20040615 <--
	EP 1498976	A3	20061025		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
	US 2005014050	A1	20050120	US 2003-620675	20030715 <--
	JP 2005038858	A	20050210	JP 2004-208178	20040715 <--
PRAI	US 2003-620675	A	20030715	<--	
AB	A method for manufacturing an electrolyte includes coupling a substrate to a charged electrode and electrodepositing a polymeric electrolyte on the substrate .				
IC	ICM H01M0008-10				
	ICS C25D0015-02; C25D0009-08				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
	Section cross-reference(s): 72				
ST	fuel cell electrolyte manuf				
	electrodeposition				
IT	Ionomers				
	RL: DEV (Device component use); USES (Uses)				
	(fluoropolymers, sulfo-containing; system and method for manufacturing fuel-cell electrolyte using electrodeposition)				
IT	Fluoropolymers, uses				
	RL: DEV (Device component use); USES (Uses)				
	(onomers, sulfo-containing; system and method for manufacturing fuel-cell electrolyte using electrodeposition)				
IT	Electrodeposition				
	Fuel cell electrolytes				
	Polymer electrolytes				
	(system and method for manufacturing fuel-cell electrolyte using electrodeposition)				

L93 ANSWER 5 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2004:203498 HCAPLUS

DN 140:244631

TI Method and apparatus for forming high **surface area** material films and membranes

IN Gore, Makarand P.; Dunfield, John Stephen

PA Hewlett-Packard Development Company, L.P., USA

SO U.S. Pat. Appl. Publ., 12 pp.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004048466	A1	20040311	US 2002-236429	20020906 <--
	US 6946362	B2	20050920		
	EP 1400330	A1	20040324	EP 2003-255246	20030822 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	JP 2004103587	A	20040402	JP 2003-315506	20030908 <--

US 2005112333 A1 20050526 US 2004-977735 20041029 <--
 PRAI US 2002-236429 A 20020906 <--
 AB The present invention discloses a method and apparatus for producing high surface area material films and membranes on substrates. In 1 application, patterns of spikes or bristles are produced on wafers and transferred to films, such as **conductive polymer** or metal films, by using repetitive and inexpensive processes, such as **electroplating** and **embossing**. Such a technique provides low cost, high surface area materials and allows reuse of expensive patterned Si. Membranes with high surface area are extremely valuable in **fuel cells** since the power d. is generally proportional to the surface area and the patterns may be used to cast inexpensive **fuel cell electrodes**.
 IC ICM H01L0021-00
 INCL 438680000; 438001000; 438455000; 438778000; 438964000
 CC 76-2 (Electric Phenomena)
 Section cross-reference(s): 52
 ST high surface area membrane **fuel cell electrode**
 IT **Polyoxyalkylenes, uses**
 RL: DEV (Device component use); USES (Uses)
 (fluorine- and sulfo-containing, **ionomers**;
 method and apparatus for forming high surface area material films and membranes)
 IT **Conducting polymers**
Electrodeposition
Embossing
Fuel cell electrodes
 Membranes, nonbiological
 (method and apparatus for forming high surface area material films and membranes)
 IT Amino acids, uses
 Antibodies and Immunoglobulins
 Carbohydrates, uses
 DNA
 Enzymes, uses
 Lipids, uses
 Proteins
 RNA
 RL: DEV (Device component use); USES (Uses)
 (method and apparatus for forming high surface area material films and membranes)
 IT **Coating materials**
 (passivating; method and apparatus for forming high surface area material films and membranes)
 IT **Fluoropolymers, uses**
 RL: DEV (Device component use); USES (Uses)
 (polyoxyalkylene-, sulfo-containing, **ionomers**;
 method and apparatus for forming high surface area material films and membranes)
 IT **Ionomers**
 RL: DEV (Device component use); USES (Uses)
 (polyoxyalkylenes, fluorine- and sulfo-
 -containing; method and apparatus for forming high surface area material films and membranes)
 IT 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-04-2, Osmium, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-15-5, Rhenium, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses 7440-33-7, Tungsten, uses 7440-48-4, Cobalt, uses
 RL: DEV (Device component use); USES (Uses)

(method and apparatus for forming high surface area material films and membranes)

L93 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2004:119828 HCAPLUS

DN 140:149214

TI Metal coated polymer electrolyte membrane

having a reinforcement structure for electrochemical devices

IN Pan, Alfred I-tsung; Jeon, Yoocham

PA Hewlett-Packard Development Company, L.P., USA

SO U.S. Pat. Appl. Publ., 11 pp.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004028973	A1	20040212	US 2002-212720	20020807 <--
	US 6977009	B2	20051220		
	WO 2004015804	A2	20040219	WO 2003-US24649	20030807 <--
	WO 2004015804	A3	20050210		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW:				
	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	AU 2003258122	A1	20040225	AU 2003-258122	20030807 <--
	EP 1527495	A2	20050504	EP 2003-784962	20030807 <--
	R:				
	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	JP 2005535098	T	20051117	JP 2004-527800	20030807 <--
	US 2006027101	A1	20060209	US 2005-250051	20051012 <--
PRAI	US 2002-212720	A	20020807	<--	
	WO 2003-US24649	W	20030807		
AB	A metal-coated, wire-reinforced polymer electrolyte membrane that is permeable only to protons and hydrogen is disclosed. The metal-coated, wire-reinforced polymer electrolyte membrane has a surface microstructure that prevents cracking of the metal coating during hydration. The metal-coated, wire-reinforced polymer electrolyte membrane can be used in liquid-type fuel cells to prevent crossover of fuel, gas and impurities.				
IC	ICM H01M0008-10				
	ICS H01M0004-86; H01M0004-92				
INCL	429030000; X42-9 4.4				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
	Section cross-reference(s): 38, 72				
ST	electrochem device metal coated polymer electrolyte membrane; fuel cell metal coated polymer electrolyte membrane				
IT	Polyamides, uses				
	Polyketones				
	RL: DEV (Device component use); USES (Uses)				
	(aromatic, sulfonated; metal coated polymer				

- electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Alloys, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(film; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Catalysts
Electrochemical cells
Polymer electrolytes
(metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Polymer blends
RL: DEV (Device component use); USES (Uses)
(metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Polyketones
RL: DEV (Device component use); USES (Uses)
(polyether-, sulfonated; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyketone-, sulfonated; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Polyquinoxalines
RL: DEV (Device component use); USES (Uses)
(polyphenylquinoxalines, sulfonated; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Fuel cells
(solid electrolyte; metal coated polymer electrolyte membrane having reinforcement structure for electrochem. devices)
- IT Polybenzimidazoles
Polybenzoxazoles
Polyimides, uses
Polymers, uses
Polyoxyphenylenes
Polysulfones, uses

Polythiophenylenes

RL: DEV (Device component use); USES (Uses)

(sulfonated; metal coated polymer

electrolyte membrane having reinforcement structure for **electrochem. devices**)

IT 7439-89-6, Iron, uses 7440-00-8, Neodymium, uses 7440-05-3, Palladium, uses 7440-06-4, **Platinum**, uses 7440-25-7, Tantalum, uses 7440-62-2, Vanadium, uses 11107-69-0

RL: TEM (Technical or engineered material use); USES (Uses)

(film; metal coated polymer **electrolyte**membrane having reinforcement structure for **electrochem. devices**)

IT 25190-62-9D, **Poly(1,4-phenylene)**, **sulfonated**

RL: DEV (Device component use); USES (Uses)

(metal coated polymer **electrolyte**membrane having reinforcement structure for **electrochem. devices**)

IT 31694-16-3, Peek 60015-03-4, Peekk 60015-05-6, Pekek

KL: DEV (Device component use); USES (Uses)

(sulfonated; metal coated polymer

electrolyte membrane having reinforcement structure for **electrochem. devices**)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Abe	1987			US 4689150 A	HCAPLUS
Anon	1996			WO 9629752	HCAPLUS
Baker	1989			US 4857080 A	HCAPLUS
Breault	2005			US 6841283 B2	HCAPLUS
Cabot	1999		25	Journal of New Mater	
Eglund	1997			US 5645626 A	HCAPLUS
Formato	2001			US 6248469 B1	HCAPLUS
Gryaznov	1979			US 4132668 A	
Hamasaki	1998			US 5830261 A	HCAPLUS
Hockaday	1997			US 5631099 A	HCAPLUS
Hockaday	1998			US 5759712 A	HCAPLUS
Inoue, H		145	13	Journal of The Elect	
Lucero	1969			US 3468781 A	HCAPLUS
Ogawa	1998			US 5782960 A	HCAPLUS
Ohsawa	1993			US 5225296 A	HCAPLUS
Sanders	1981			US 4254086 A	HCAPLUS
Scheil	1979			US 4134742 A	HCAPLUS
Sirinyan	1989			US 4804475 A	HCAPLUS
Thornton	2002			US 6475268 B2	HCAPLUS
Tu	1998	143	373	Electrochimica Acta	
Warszawski	1975			US 3902916 A	HCAPLUS

L93 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2003:935073 HCAPLUS

DN 140:393365

TI Tungsten carbide-supported **platinum-lead** catalysts as **porous electrodes** for methanol **fuel** **cells** manufacture

IN Shen, Peikang

PA Zhongshan University, Peop. Rep. China

SO Faming Zhuanli Shengqing Gongkai Shuomingshu, 9 pp.

CODEN: CNXXEV

BT **Patent**

LA Chinese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CN 1385914	A	20021218	CN 2002-115378	20020614 <--
PRAI	CN 2002-115378		20020614 <--		
AB	<p>A porous catalytic electrode for methanol fuel cells consists of nanometer-sized or micron-sized WC, C, or an oxide of Si, Pb, W, Sn, or Al, and a catalytic active material (e.g., a Pt group metal or alloy, porphyrin, phthalocyanine, rare earth metal, or transition metal) is deposited by constant-current electrochem. reduction on a substrate selected from Au, Pt, Ti, Ag (or alloys), stainless steel, hard Al alloy, carbon paper, carbon fibers, or ITO conductive glass. Pt/WO3 electrode is fabricated by constant-current electrochem. reduction in a 30% aqueous isopropanol solution containing 50 mM W and 4-8 mM Pt (prepared from Pt black) under constant currents. Pt/Pb/PbOy electrode is prepared by: (1) preparation of a Nafion suspension containing Pb(NO3)2, HClO4, NaF, and MeOH, (2) anodization at 20 mA/cm for 3 min to deposit Pb oxide, and (3) electrolysis in aqueous chloroplatinic acid at cathodic currents 0.2 mA/cm2 for 2 min. Pt/Ru/WO3 electrode is prepared by electrochem. reduction in a solution containing W, chloroplatinic acid, and RuO2 at -0.15 V (vs. SEC) for 30 min.</p>				
IC	<p>ICM H01M0004-86 ICS H01M0004-88</p>				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	methanol fuel cell catalytic electrode				
	manuf; platinum lead tungsten carbide electrode				
	methanol fuel cell				
IT	Carbon fibers, uses				
	RL: DEV (Device component use); USES (Uses)				
	(catalyst substrate; tungsten carbide-supported platinum-lead catalysts as porous electrodes for methanol fuel cells)				
IT	Porphyrins				
	Rare earth metals, uses				
	Transition metals, uses				
	RL: DEV (Device component use); USES (Uses)				
	(catalyst support; tungsten carbide-supported platinum-lead catalysts as porous electrodes for methanol fuel cells)				
IT	Polyoxyalkylenes, uses				
	RL: DEV (Device component use); USES (Uses)				
	(fluorine- and sulfo-containing, ionomers, electrodes; tungsten carbide-supported platinum-lead catalysts as porous electrodes for methanol fuel cells)				
IT	Fluoropolymers, uses				
	RL: DEV (Device component use); USES (Uses)				
	(polyoxyalkylene-, sulfo-containing, ionomers, electrodes; tungsten carbide-supported platinum-lead catalysts as porous electrodes for methanol fuel cells)				
IT	Ionomers				
	RL: DEV (Device component use); USES (Uses)				
	(polyoxyalkylenes, fluorine- and sulfo-containing, electrodes; tungsten carbide-supported platinum-lead catalysts as porous electrodes for methanol fuel cells)				
IT	Fuel cell anodes				

- Fuel cell cathodes
Fuel cell electrodes
 (tungsten carbide-supported **platinum-lead** catalysts as
porous electrodes for methanol fuel
 cells)
- IT **Platinum-group metals**
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
 (tungsten carbide-supported **platinum-lead** catalysts as
porous electrodes for methanol fuel
 cells)
- IT **Platinum alloy, base**
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
 (tungsten carbide-supported **platinum-lead** catalysts as
porous electrodes for methanol fuel
 cells)
- IT 7440-22-4, Silver, uses 7440-32-6, Titanium, uses 7440-57-5, Gold,
 uses **12597-68-1, Stainless steel**, uses
 RL: DEV (Device component use); USES (Uses)
 (catalyst **substrate**; tungsten carbide-supported
platinum-lead catalysts as **porous electrodes**
 for methanol fuel cells)
- IT 574-93-6, Phthalocyanine
 RL: DEV (Device component use); USES (Uses)
 (catalyst support; tungsten carbide-supported **platinum-lead**
 catalysts as **porous electrodes** for methanol
 fuel cells)
- IT 1314-35-8, Tungsten oxide (WO₃), uses 1332-29-2, Tin oxide 1335-25-7,
 Lead oxide 7439-92-1, Lead, uses 7440-06-4, **Platinum**, uses
 7440-18-8, Ruthenium, uses
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
 (tungsten carbide-supported **platinum-lead** catalysts as
porous electrodes for methanol fuel
 cells)
- IT 67-56-1, Methanol, processes
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (tungsten carbide-supported **platinum-lead** catalysts as
porous electrodes for methanol fuel
 cells)
- IT **12597-68-1, Stainless steel**, uses
 RL: DEV (Device component use); USES (Uses)
 (catalyst **substrate**; tungsten carbide-supported
platinum-lead catalysts as **porous electrodes**
 for methanol fuel cells)
- RN 12597-68-1 HCAPLUS
 CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 2003:699624 HCAPLUS
 DN 140:114082
 TI A modified Nafion membrane with in situ **polymerized**
polypyrrole for the direct methanol fuel cell
 AU Smit, M. A.; Ocampo, A. L.; Espinosa-Medina, M. A.; Sebastian, P. J.
 CS Centro de Investigacion en Energia (CIE), Temixco, UNAM, Morelos, 62580,
 Mex.
 SO Journal of Power Sources (2003), 124(1), 59-64
 CODEN: JPSODZ; ISSN: 0378-7753
 PB Elsevier Science B.V.

DT Journal
LA English
AB Nafion membranes were modified by the in situ **electrodeposition** of **polypyrrole** inside the membrane pores and on the anode side only, to prevent the cross-over of methanol in the direct methanol fuel cell (DMFC). Pretreated Nafion membranes were 1st immersed in 0.1M sulfuric acid containing the pyrrole monomer and subsequently removed from this solution and placed in a two-electrode solid-state electrochem. cell, where the **polypyrrole** was formed galvanostatically. The modified membranes were studied in terms of morphol., electrochem. characteristics and methanol permeability. FTIR and SEM confirmed the presence of the **polypyrrole** on the anode side of the Nafion membrane. SEM shows the polymer to be present both on the membrane surface and inside the membrane pores. It is deposited as small grains, with two distinct sizes, the smallest particles have a diameter of .apprx.100 nm, while the larger particles have diams. of .apprx.700 nm. Methanol permeability was determined electrochem. and is effectively reduced. Cyclic voltammetry (CV) was performed in sulfuric acid, in pure methanol and in 50 volume % Methanol. The untreated Nafion membrane showed CV curves which were similar in all electrolytes with electroactivity only at the extreme ends of the curve. The Nafion/PPy membrane showed typical **polypyrrole** curves, with current densities lowest in sulfuric acid, and highest in the 50 volume % Methanol, resp. For the methanol containing electrolytes, an addnl. oxidative peak appears in the CV, which may be related to electrocatalytic activity of the **polypyrrole** for methanol oxidation

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 36, 38, 76

ST Nafion membrane electropolymerized polypyrrole composite methanol fuel cell voltammetry

IT Membranes, nonbiological
(elec. conductive; modified Nafion membrane with in situ polymerized polypyrrole for direct methanol fuel cell and modification of methanol permeability)

IT Electrodeposition
(electropolymn.; modified Nafion membrane with in situ polymerized polypyrrole for direct methanol fuel cell and modification of methanol permeability)

IT Current density
Cyclic voltammetry
Fuel cell separators
Polymer electrolytes
(modified Nafion membrane with in situ polymerized polypyrrole for direct methanol fuel cell and modification of methanol permeability)

IT Particle size
(of PPy grains on and inside pores of composite membrane; modified Nafion membrane with in situ polymerized polypyrrole for direct methanol fuel cell and modification of methanol permeability)

IT Electric current-potential relationship
(of assembled fuel cells; modified Nafion membrane with in situ polymerized polypyrrole for direct methanol fuel cell and modification of methanol permeability)

IT Polymer morphology

- (of **electropolymd. polypyrrole** blends with **Nafion**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT Permeability
(of membranes to methanol as determined by **fuel cell** current-voltage behavior; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT Carbon fibers, uses
RL: DEV (Device component use); USES (Uses)
(paper, **electrode** between membranes; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 30604-81-0P, **Polypyrrole**
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(composite with **Nafions**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 66796-30-3, **Nafion-117**
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(composites with **electropolymd. polypyrrole**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 77950-55-1P, **Nafion-115**
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(composites with **electropolymd. polypyrrole**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 12597-68-1, **Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**electrodes**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 7664-93-9, **Sulfuric acid**, uses
RL: DEV (Device component use); USES (Uses)
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 109-97-7, **Pyrrrole**
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 67-56-1, **Methanol**, uses
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
- IT 66796-30-3, **Nafion-117**
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(composites with **electropolymd. polypyrrole**;

modified Nafion membrane with in situ polymerized
 polypyrrole for direct methanol fuel cell
 and modification of methanol permeability)

RN 66/96-30-3 HCAPLUS
 CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 77950-55-1P, Nafion-115
 RL: DEV (Device component use); PRP (Properties); SPN (Synthetic
 preparation); PREP (Preparation); USES (Uses)
 (composites with electropolymd. polypyrrole;
 modified Nafion membrane with in situ polymerized
 polypyrrole for direct methanol fuel cell
 and modification of methanol permeability)

RN 77950-55-1 HCAPLUS
 CN Nafion 115 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 12597-68-1, Stainless steel, uses
 RL: DEV (Device component use); USES (Uses)
 (electrodes; modified Nafion membrane with in situ
 polymerized polypyrrole for direct methanol fuel
 cell and modification of methanol permeability)

RN 12597-68-1 HCAPLUS
 CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Arimura, T	1999	118	1	Solid State Ionics	HCAPLUS
Bose, C	1992	333	235	J Electroanal Chem	HCAPLUS
Burstein, G	1997	138	425	Catal Today	HCAPLUS
Chang, C	1995	300	15	Anal Chim Acta	HCAPLUS
Chen, C	1993	350	161	J Electroanal Chem	HCAPLUS
de Bruyne, A	1998	99	118	Surf Coatings Techno	HCAPLUS
Endres, F	1997	88	73	Synth Metals	HCAPLUS
Fusarba, F	1999	103	9044	J Phys Chem B	HCAPLUS
Hable, C	1993	9	3284	Langmuir	HCAPLUS
Hammache, H	2001	123	515	Synth Metals	HCAPLUS
Hong, L	1999	218	233	J Colloid Interface	HCAPLUS
Jiang, R	2002	5	A156	Electrochem Solid St	HCAPLUS
Kulesza, P	1999	44	2131	Electrochim Acta	HCAPLUS
Lin, C	1998	55	139	Mater Chem Phys	HCAPLUS
Ludvigsson, M	2000	45	2267	Electrochim Acta	HCAPLUS
Musio, F	1997	41	97	Sens Actuators B	
Radhakrishnan, S	2001	341	518	Chem Phys Lett	HCAPLUS
Shigehara, K	1987	18	721	Synth Metals	HCAPLUS
Sundmacher, K	2001	56	333	Chem Eng Sci	HCAPLUS
Tazi, B	2000	45	4329	Electrochim Acta	HCAPLUS
Topart, P	1992	96	7824	J Phys Chem	HCAPLUS
Topart, P	1992	96	8662	J Phys Chem	HCAPLUS

L93 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2003:667052 HCAPLUS

EN 139:354840

TI Electrophoretic deposition of zeolites

AU Depase, Edoardo; Talbot, Jan B.

CS Chemical Engineering Program, University of California, La Jolla, CA,

- 92093-0411, USA
- SO Proceedings - Electrochemical Society (2002),
2002-21(Electrophoretic Deposition), 86-93
CODEN: PESODO; ISSN: 0161-6374
- PB Electrochemical Society
- DT Journal
- LA English
- AB The **electrophoretic deposition** of zeolite 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports** was investigated as a procedure for the preparation of the supported membranes. The effects of the applied voltage and **deposition** time on the **deposit** mass, film morphol. and adhesion strength were studied. Post-**deposition** treatments, such as baking of the **deposits** and **coating** with Nafion, enhanced the adhesion strength of the films.
- CC 66-4 (Surface Chemistry and Colloids)
- ST Section cross-reference(s): 55, 56, 72, 78
electrophoretic deposition zeolite aluminum
stainless steel porous supports
- IT Films
(**electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT Zeolite 3A
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(**electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT Membranes, nonbiological
(**electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports** for preparation of supported membranes)
- IT Electric potential
(for **electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT Adhesion, physical
(of zeolites 3A films **electrophoretically deposited** in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT Coating materials
Coating process
(of zeolites 3A films **electrophoretically deposited** in iso-Pr alc. onto **stainless steel porous supports**, with Nafion)
- IT **Electrophoretic deposition**
(of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT Electrodes
(porous; **electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT 7429-90-5, Aluminum, uses 12597-68-1, **Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous supports**)
- IT 67-63-0, 2-Propanol, uses

RL: NUU (Other use, unclassified); USES (Uses)
 (electrophoretic deposition of zeolites 3A films in
 iso-Pr alc. onto aluminum disks and stainless steel
 porous supports)

IT 66796-30-3, Nafion 117

RL: NUU (Other use, unclassified); USES (Uses)
 (of zeolites 3A films electrophoretically deposited
 in iso-Pr alc. onto stainless steel porous
 supports, with Nafion)

IT 12597-68-1, Stainless steel, uses

RL: DEV (Device component use); USES (Uses)
 (electrophoretic deposition of zeolites 3A films in
 iso-Pr alc. onto aluminum disks and stainless steel
 porous supports)

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 66796-30-3, Nafion 117

RL: NUU (Other use, unclassified); USES (Uses)
 (of zeolites 3A films electrophoretically deposited
 in iso-Pr alc. onto stainless steel porous
 supports, with Nafion)

RN 66796-30-3 HCAPLUS

CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author (RAU)	Year (RKY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Ahlers, C	2000	145	13379	Electrochimica Acta	HCAPLUS
Ahlers, C	1999	146	13259	J Electrochem Soc	HCAPLUS
Aoki, K	2000	146	1221	AIChE J	HCAPLUS
Aoki, K	1998	141	1197	J Membrane Sci	HCAPLUS
Bakker, W	1996	117	157	J Membrane Sci	HCAPLUS
Bernal, M	2000	156	1221	Catal Today	HCAPLUS
Geus, E	1993	11	1131	J Membrane Sci	HCAPLUS
Jafar, J	1997	112	1305	Microporous Mat	HCAPLUS
Jia, M	1993	182	115	J Membrane Sci	HCAPLUS
Keizer, K	1998	146	1159	J Membrane Sci	HCAPLUS
Kusakabe, K	1997	136	1649	Ind Eng Chem Res	HCAPLUS
Kusakabe, K	1996	116	139	J Membrane Sci	HCAPLUS
Murray, C	1984	164	1205	J Electroanal Chem	HCAPLUS
Russ, B	1998	168	1257	J Adhesion	HCAPLUS
Russ, B	1998	145	1245	J Electrochem Soc	HCAPLUS
Seike, T	2002	12	1366	J Mater Chem	HCAPLUS
Shane, M	1994	165	1334	J Colloids and Interf	HCAPLUS
Suer, M	1994	91	177	J Membrane Sci	HCAPLUS
Takayama, Y	1999	107	1437	J Ceramic Soc Japan	HCAPLUS
Tsapatsis, M	1999	124	130	MRS Bulletin	HCAPLUS
Yan, Y	1997	126	153	J Membrane Sci	HCAPLUS
Zhang, Y	1992	1271	1465	Better Ceramics Thro	HCAPLUS

93 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2003:124206 HCAPLUS

DN 138:313428

TI Improved Electrodeposited Iridium Oxide pH Sensor Fabricated on
 Etched Titanium Substrates

AU Marzouk, Sayed A. M.

- CS Department of Chemistry Faculty of Science, United Arab Emirates
University, Al-Ain, United Arab Emirates
- SO Analytical Chemistry (2003), 75(6), 1258-1266
CODEN: ANCHAM; ISSN: 0003-2700
- PB American Chemical Society
- DT Journal
- LA English
- AB The preparation and characterization of an improved solid-state pH sensor are described. The sensor is based on anodically **electrodeposited** iridium oxide film, as a pH-sensing layer. Merits of the present sensor include (i) excellent adhesion of the pH sensitive layer to the **substrate**, (ii) excellent reproducibility of sensor fabrication, (iii) faster preparation procedure, and (iv) low cost of the titanium **substrate**. These advantages are realized by combining acid-etched titanium as the **electrode substrate** with an optimized **electrodeposition solution** consisting of IrCl₄ as an iridium source, hydrogen peroxide, potassium oxalate, and potassium carbonate. Heating the **electrodeposition solution** to 90° reduced the time required for **solution** development from approx.3 days to 10 min. The pH-sensing layer is protected with a layer of **Nafion** and a **microporous polyester** membrane. The improved sensor showed a super-Nernstian response (-73.7 ± 1.2 mV/pH unit) in the pH range of 1.5-11.5. The present pH sensor, fabricated in a tubular form, is used as a detector in a flow injection anal. (FIA) system for pH measurements. Optimization of the FIA exptl. parameters resulted in a linear dependence of peak heights on the pH of the injected samples in the pH range of 2-11.
- CC 79-2 (Inorganic Analytical Chemistry)
Section cross-reference(s): 61
- ST **electrodeposited** iridium oxide pH sensor fabrication etched titanium **substrate**
- IT Flow injection analysis
(pH determination by flow injection anal. using improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)
- IT **Electrodeposition**
Electronic device fabrication
Film **electrodes**
Micro**electrodes**
Sensors
pH
pH **electrodes**
(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)
- IT Alloys, analysis
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(**substrate**; pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)
- IT 12030-49-8, Iridium oxide
RL: ARU (Analytical role, unclassified); CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); ANST (Analytical study); PROC (Process); USES (Uses)
(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)
- IT 584-08-7, Potassium carbonate 7722-84-1, Hydrogen peroxide, processes 10043-22-8, Potassium oxalate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 10025-97-5, Iridium chloride (IrCl₃)

RL: RCT (Reactant); RACT (Reactant or reagent)

(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 7440-02-0, Nickel, analysis 7440-22-4, Silver, analysis 7440-32-6, Titanium, analysis 7440-33-7, Tungsten, analysis 7440-48-4, Cobalt, analysis 7440-50-8, Copper, analysis 7440-57-5, Gold, analysis 7440-67-7, Zirconium, analysis 11106-97-1 12597-68-1, Stainless steel, analysis 37286-21-8, Hastelloy

RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)

(**substrate**; pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 12597-68-1, Stainless steel, analysis

RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)

(**substrate**; pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alegret, S	1989	222	373	Anal Chim Acta	HCAPLUS
Ardizzone, S	1981	126	287	IJ Electroanal Chem	HCAPLUS
Baur, J	1998	443	208	IJ Electroanal Chem	HCAPLUS
Bezbaruah, A	2002	74	5726	Anal Chem	HCAPLUS
Dexter, S	2000	15	313	Biofouling	HCAPLUS
Donghong, W	2000	166	16	Sens Actuators, B	HCAPLUS
Hauser, P	1989	221	139	Anal Chim Acta	HCAPLUS
Hitchman, M	1988	113	135	Analyst	HCAPLUS
Hongbo, C	1985	169	209	Anal Chim Acta	HCAPLUS
Izumiya, K	1998	43	3303	Electrochim Acta	HCAPLUS
Katsube, T	1982	12	399	Sens Actuators	HCAPLUS
Kinjen, P	1994	22	13	Sens Actuators, B	HCAPLUS
Lee, I	2002	23	2375	Biomaterials	HCAPLUS
Lee, I	2002	23	2375	Biomaterials	HCAPLUS
Madsen, B	1987	59	127	Anal Chem	HCAPLUS
Marzouk, S	2002	1308	52	Anal Biochem	HCAPLUS
Marzouk, S	1998	170	5054	Anal Chem	HCAPLUS
Meyer, R	2001	19	12	IEEE Eng Med Biol Soc	MEDLINE
Petit, M	1998	1444	247	IJ Electroanal Chem	HCAPLUS
Ruzicka, J	1981	1	1	Flow Injection Anal	HCAPLUS
Suzuki, H	1999	171	1737	Anal Chem	HCAPLUS
Suzuki, H	2000	405	57	Anal Chim Acta	HCAPLUS
van Staden, J	1986	111	1231	Analyst	HCAPLUS
Wang, M	2002	81	313	Sens Actuators, B	HCAPLUS
Wang, M	2002	81	313	Sens Actuators, B	HCAPLUS
Wipf, D	2000	72	14921	Anal Chem	HCAPLUS
Yamanaka, K	1989	28	632	Jpn J Appl Phys	HCAPLUS
Zampronio, C	2000	51	1163	Talanta	HCAPLUS
Zhang, J	1998	452	235	IJ Electroanal Chem	HCAPLUS

L93 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2002:9883 HCAPLUS

EN 136:87952

TI **Polyelectrolyte-coated permeable composite material,**
method for producing the same and its use

IN Hying, Christian; Hoerpel, Gerhard; Bernd; Krasemann, Lutz;
Toutianoush, Ali

PA Creavis Gesellschaft fuer Technologie und Innovation mbH, Germany

SO Eur. Pat. Appl., 18 pp.

CODEN: EPXXDW

DT **Patent**

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1166860	A2	20020102	EP 2001-114428	20010615 <--
	EP 1166860	A3	20020109		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	DE 10031281	A1	20020110	DE 2000-10031281	20000627 <--
	NO 2001003106	A	20011228	NO 2001-3106	20010621 <--
	JP 2002066277	A	20020305	JP 2001-192053	20010625 <--
	CA 2351747	A1	20011227	CA 2001-2351747	20010626 <--
	US 2002039648	A1	20020404	US 2001-891314	20010627 <--
PRAI	DE 2000-10031281	A	20000627	<--	

AB The membrane is prepared by forming a **polyelectrolyte** membrane layer on a perforated **substrate** made of an inorg. material, preferably a metal, transition metal, or a mixed metal with at least one Group III-VII element. The **polyelectrolyte** layer may be a **poly allylamine hydrochloride**, **polyethylenimine**, **polyvinyl amine**, a potassium salt of **polysulfate**, a sodium salt of **polystyrene sulfonate**, or **polyacrylamido-2-methyl-1-propanesulfonic acid**. The **substrate** may be a **stainless steel** mesh. The **polyelectrolyte-coated** composite is suitable for as a membrane in **fuel cell** or as a membrane in pervaporation or gas permeation or for separation of alc.-water mixts., especially

ethanol-water mixts.

IC ICM B01D0069-12

ICS B01D0071-02; B01D0067-00; B01D0061-36; B01D0053-22

CC 48-1 (Unit Operations and Processes)

ST membrane **polyelectrolyte coated** composite

IT **Fluoropolymers, reactions**

Polysulfones, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(aminolyzed or **sulfonated**; **polyelectrolyte-coated** permeable composite material, method for producing the same and its use)

IT **Polyethers, reactions**

RL: RCT (Reactant); RACT (Reactant or reagent)

(**polyamide-**, aminolyzed or **sulfonated**; **polyelectrolyte-coated** permeable composite material, method for producing the same and its use)

IT Composites

Membranes, nonbiological

Polyelectrolytes

(**polyelectrolyte-coated** permeable composite material, method for producing the same and its use)

IT Bronsted acids

Fluoropolymers, reactions
 Zeolites (synthetic), reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (polyelectrolyte-coated permeable composite
 material, method for producing the same and its use)

IT Polymides, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (polyether-, aminolyzed or sulfonated;
 polyelectrolyte-coated permeable composite material,
 method for producing the same and its use)

IT 12597-68-1, Stainless steel, uses
 RL: DEV (Device component use); USES (Uses)
 (polyelectrolyte-coated permeable composite
 material, method for producing the same and its use)

IT 64-17-5P, Ethanol, reactions
 RL: PUR (Purification or recovery); RCT (Reactant); PREP (Preparation);
 RACT (Reactant or reagent)
 (polyelectrolyte-coated permeable composite
 material, method for producing the same and its use)

IT 78-10-4, Tetraethylorthosilicate 546-68-9, Titanium tetraisopropylate
 1310-73-2, Sodium hydroxide, reactions 1344-28-1, Alumina, reactions
 7429-90-5, Aluminum, reactions 7429-90-5D, Aluminum, alc. salts
 7439-89-6, Iron, reactions 7439-93-2, Lithium, reactions 7439-95-4,
 Magnesium, reactions 7439-96-5, Manganese, reactions 7439-98-7,
 Molybdenum, reactions 7440-02-0, Nickel, reactions 7440-09-7,
 Potassium, reactions 7440-21-3, Silicon, reactions 7440-23-5, Sodium,
 reactions 7440-32-6, Titanium, reactions 7440-33-7, Tungsten,
 reactions 7440-47-3, Chromium, reactions 7440-48-4, Cobalt, reactions
 7440-50-8, Copper, reactions 7440-62-2, Vanadium, reactions
 7440-62-2D, Vanadium, alc. salts 7440-65-5, Yttrium, reactions
 7440-66-6, Zinc, reactions 7440-67-7, Zirconium, reactions 7440-70-2,
 Calcium, reactions 7601-89-0 7647-01-0, Hydrochloric acid, reactions
 7647-14-5, Sodium chloride, reactions 7697-37-2, Nitric acid, reactions
 7722-64-7, Potassium permanganate 9002-84-0,
 Polytetrafluoroethylene 13463-67-7, Titania, reactions
 24937-79-9D, Polyvinylidene fluoride, aminolyzed or
 sulfonated 26336-38-9, Polyvinyl amine 26837-42-3,
 Polyvinyl sulfate, potassium salt 27119-07-9 68092-72-8
 71550-12-4, Poly(allylamine hydrochloride) 260784-99-4, Silane
 285
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (polyelectrolyte-coated permeable composite
 material, method for producing the same and its use)

IT 12597-68-1, Stainless steel, uses
 RL: DEV (Device component use); USES (Uses)
 (polyelectrolyte-coated permeable composite
 material, method for producing the same and its use)

RN 12597-68-1 HCAPLUS
 CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2001:661755 HCAPLUS

SN 135:213483

TI Method of fabrication of gas diffusion electrode with nanosized
 pores for polymer electrolyte membrane
 fuel cells

IN Appley, A. John; Gamburzev, Sergei

PA The Texas A and M University System, USA

SO PCT Int. Appl., 70 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001065617	A2	20010907	WO 2001-US4486	20010209 <--
	WO 2001065617	A3	20020613		
	WO 2001065617	A9	20031002		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LF, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PI, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
	RW:				
	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	US 2001031389	A1	20011018	US 2001-779868	20010208 <--
	US 6649299	B2	20031118		
	US 2001033956	A1	20011025	US 2001-779872	20010208 <--
	US 6770394	B2	20040803		
	AU 2001068024	A5	20010912	AU 2001-68024	20010209 <--
	US 2004241063	A1	20041202	US 2004-879341	20040629 <--
PRAI	US 2000-181893P	P	20000211	<--	
	US 2000-181894P	P	20000211	<--	
	US 2000-182010P	P	20000211	<--	
	US 2001-779868	A	20010208	<--	
	US 2000-181995P	P	20000211	<--	
	US 2000-182069P	P	20000211	<--	
	US 2001-779872	A3	20010208	<--	
	WO 2001-US4486	W	20010209	<--	
AB	The title electrode contains an electrocatalyst , a polymer electrolyte and nanosized pores . The pores are formed using nanosized pore-formers . The pore-former is applied to a substrate along with a polymer electrolyte and an electrocatalyst and the resulting structure is treated to remove the pore-former .				
IC	H01M0004-00				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	fuel cell gas diffusion electrode				
IT	Catalysts				
	(electrocatalysts; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)				
IT	Carbon fibers, uses				
	RL: TEM (Technical or engineered material use); USES (Uses) (fabrics, substrate; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)				
IT	Polyoxyalkylenes, uses				
	RL: DEV (Device component use); USES (Uses) (fluorine- and sulfo-containing, ionomers; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)				
IT	Fuel cell electrodes				
	(gas diffusion; method of fabrication of gas diffusion				

electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Polymer electrolytes

Pore

(method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Carbon black, uses

RL: MOA (Modifier or additive use); USES (Uses)

(method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Graphitized carbon black

RL: TEM (Technical or engineered material use); USES (Uses)

(method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(perfluoroalkoxy; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Sulfonic acids, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(perfluorosulfonic acid polymers, membrane; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Fuel cells

(polymer electrolyte membrane; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Fluoropolymers, uses

RL: DEV (Device component use); USES (Uses)

(polyoxyalkylene-, sulfo-containing, ionomers; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Ionomers

RL: DEV (Device component use); USES (Uses)

(polyoxyalkylenes, fluorine- and sulfo-containing; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Metals, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(porous, substrate; method of fabrication of gas diffusion electrode with nanosized pores for polymer electrolyte membrane fuel cells)

IT Fluoropolymers, uses

Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(sulfo-containing, membrane; method of fabrication of gas

- diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
- IT 7440-57-5, Gold, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(Al **plated** with; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel** cells)
- IT 11116-16-8, Titanium nitride
RL: TEM (Technical or engineered material use); USES (Uses)
(**coating**; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel** cells)
- IT 7631-86-9, Fumed silica, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(colloidal, **pore** former; method of fabrication of gas
diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
- IT 91033-96-4
RL: CAT (Catalyst use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel** cells)
- IT 7440-06-4, Platinum, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel** cells)
- IT 163294-14-2, nafion 112
RL: DEV (Device component use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel** cells)
- IT 7440-31-5, Tin, uses 9002-84-0, Ptf 12597-68-1,
stainless steel, uses 24937-79-9, Pvd 25067-11-2,
Perfluoroethylene-perfluoropropylene copolymer
190673-42-8, Gore-select
RL: TEM (Technical or engineered material use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel** cells)
- IT 7429-90-5, Aluminum, uses 7440-02-0, Nickel, uses 7440-32-6, Titanium,
uses 7440-50-8, Copper, uses 11106-92-6
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous**, **substrate**; method of fabrication of gas
diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
- IT 7440-44-0, Carbon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**substrate**; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel** cells)
- IT 163294-14-2, nafion 112
RL: DEV (Device component use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel** cells)
- RN 163294-14-2 HCAPLUS

CN Nafion 112 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 12597-68-1, stainless steel, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (method of fabrication of gas diffusion electrode with
 nanosized pores for polymer electrolyte
 membrane fuel cells)

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2001:632217 HCAPLUS

DN 135:183311

TI Separators for solid polymer electrolyte fuel
 cells

IN Okuda, Nobuyuki; Okubo, Soichiro; Ohara, Hisanori

PA Sumitomo Electric Industries, Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001236967	A	20010831	JP 2000-49334	20000225 <--
PRAI	JP 2000-49334		20000225 <--		
AB	The separators have a metal substrate coated with ≥2 different metal nitride layers.				
IC	ICM H01M0008-02				
	ICS H01M0008-10				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	polymer electrolyte fuel cell metal separator nitride coating				
IT	Fuel cell separators (metal separators with multiple different metal nitride coatings for polymer electrolyte fuel cells)				
IT	11109-50-5, sus 304		12616-83-0, a 5052		
	RL: DEV (Device component use); USES (Uses) (metal separators with multiple different metal nitride coatings for polymer electrolyte fuel cells)				
IT	12033-19-1, Molybdenum nitride (MoN)		12033-62-4, Tantalum nitride		
	12058-38-7, Tungsten nitride (WN)		24094-93-7, Chromium nitride (CrN)		
	24304-00-5, Aluminum nitride		24621-21-4, Niobium nitride		
	24646-85-3, Vanadium nitride		25583-20-4, Titanium nitride		25658-42-8,
	Zirconium nitride		25817-87-2, Hafnium nitride		
	RL: MOA (Modifier or additive use); USES (Uses) (metal separators with multiple different metal nitride coatings for polymer electrolyte fuel cells)				
IT	11109-50-5, sus 304				
	RL: DEV (Device component use); USES (Uses) (metal separators with multiple different metal nitride coatings for polymer electrolyte fuel cells)				
RN	11109-50-5		HCAPLUS		

CN Iron alloy, base, Fe 66-74,Cr 18.00-20.00,Ni 8.00-10.50,Mn 0-2.00,Si
0-1.00,C 0-0.08,P 0-0.045,S 0-0.030 (UNS S30400) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 74	7439-89-6
Cr	18.00 - 20.00	7440-47-3
Ni	8.00 - 10.50	7440-02-0
Mn	0 - 2.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.08	7440-44-0
P	0 - 0.045	7723-14-0
S	0 - 0.030	7704-34-9

IT **24304-00-5**, Aluminum nitride
 RL: MOA (Modifier or additive use); USES (Uses)
 (metal separators with multiple different metal nitride
 coatings for **polymer electrolyte**
fuel cells)
 RN 24304-00-5 HCAPLUS
 CN Aluminum nitride (AlN) (CA INDEX NAME)

N
I
A

L93 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN **2001:101462** HCAPLUS
 SN 134:134143
 TI Structures and fabrication techniques for solid state
electrochemical devices
 IN Visco, Steven J.; Jacobson, Craig P.; Dejonghe, Lutgard C.
 PA The Regents of the University of California, USA
 SO PCT Int. Appl., 45 pp.
 CODEN: PIXXD2

DT **Patent**
 LA English
 FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2001009968	A1	20010208	WO 2000-US20889	20000728 <--
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, BY				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6605316	B1	20030812	US 2000-626629	20000727 <--
EP 1228546	A1	20020807	EP 2000-953766	20000728 <--
EP 1228546	B1	20060405		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, SK, FI, RO, MK, CY, AL				
AT 322745	T	20060415	AT 2000-953766	20000728 <--

	ES 2261225	T3	20061116	ES 2000-953766	20000728 <--
	US 2003059668	A1	20030327	US 2002-273812	20021017 <--
	US 6979511	B2	20051227		
	US 2006057295	A1	20060316	US 2005-260009	20051026 <--
	US 7118777	B2	20061010		
	US 2006234112	A1	20061019	US 2006-471774	20060620 <--
PRA1	US 1999-146769P	P	19990731	<--	
	US 2000-626629	A	20000727	<--	
	WO 2000-US20889	W	20000728	<--	
	US 2002-273812	A1	20021017	<--	
	US 2005-260009	A1	20051026		

AB Provided are low-cost, mech. strong, highly **electronically conductive porous substrates** and associated structures for solid-state **electrochem.** devices, techniques for forming these structures, and devices incorporating the structures. The invention provides solid state **electrochem.** device **substrates** of novel composition and techniques for forming thin **electrode/membrane/electrolyte coatings** on the novel or more conventional **substrates**. In particular, in one embodiment the invention provides techniques for co-firing of device **substrate** (often an **electrode**) with an **electrolyte** or membrane layer to form densified **electrolyte/membrane** films 5 to 20 μm thick. In another embodiment, densified **electrolyte/membrane** films 5 to 20 μm thick may be formed on a pre-sintered **substrate** by a constrained sintering process. In some cases, the **substrate** may be a **porous** metal, alloy, or non-nickel cermet incorporating one or more of the transition metals Cr, Fe, Cu and Ag, or alloys thereof.

IC H01M0008-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 55, 57, 72

ST **electrochem** device solid state; **fuel cell** solid state

IT Coating process
(dip; structures and fabrication techniques for solid state **electrochem.** devices)

IT Catalysts
(**electrocatalysts**; structures and fabrication techniques for solid state **electrochem.** devices)

IT Electric apparatus
(**electrochem.**; structures and fabrication techniques for solid state **electrochem.** devices)

.I Electric conductors
(mixed, **electronic-ionic**; structures and fabrication techniques for solid state **electrochem.** devices)

IT Transition metal alloys
Transition metals, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(non-noble, **substrate**; structures and fabrication techniques for solid state **electrochem.** devices)

IT Coating process
(spray, aerosol; structures and fabrication techniques for solid state **electrochem.** devices)

II Ceramic coatings
Electrophoretic deposition
Ionic conductors
Sintering
Solid state **fuel cells**
Thermal expansion
(structures and fabrication techniques for solid state

- electrochem. devices)
- IT Cermet
(**substrate**; structures and fabrication techniques for solid state **electrochem. devices**)
- IT Molding
(tape-casting; structures and fabrication techniques for solid state **electrochem. devices**)
- IT Diffusion
(vacuum; structures and fabrication techniques for solid state **electrochem. devices**)
- IT 25805-17-8, XUS 40303.00
RL: TEM (Technical or engineered material use); USES (Uses)
(binder; structures and fabrication techniques for solid state **electrochem. devices**)
- IT 12036-39-4, Strontium zirconium oxide srzro3 12267-77-5, Barium cerium oxide baceo3 12267-97-9, Cerium strontium oxide cesro3
RL: TEM (Technical or engineered material use); USES (Uses)
(doped; structures and fabrication techniques for solid state **electrochem. devices**)
- IT 12597-69-2, Steel, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(ferritic, **substrate**; structures and fabrication techniques for solid state **electrochem. devices**)
- IT 112721-99-0
RL: DEV (Device component use); USES (Uses)
(structures and fabrication techniques for solid state **electrochem. devices**)
- IT 1333-74-0P, Hydrogen, preparation
RL: SPN (Synthetic preparation); PREP (Preparation)
(structures and fabrication techniques for solid state **electrochem. devices**)
- IT 222613-26-5, Cobalt iron strontium oxide Co0.75Fe0.25SrO3
RL: TEM (Technical or engineered material use); USES (Uses)
(structures and fabrication techniques for solid state **electrochem. devices**)
- IT 11109-52-7, AISI 430 **12611-79-9**, AISI 410 39418-83-2, AISI 409
RL: TEM (Technical or engineered material use); USES (Uses)
(**substrate**, composite with ceramic; structures and fabrication techniques for solid state **electrochem. devices**)
- IT 1344-28-1, Alumina, uses 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-22-4, Silver, uses 7440-47-3, Chromium, uses 7440-50-8, Copper, uses 11078-74-3, Bismuth yttrium oxide (Bi3YO6) 12606-02-9, Inconel 600 59989-70-7D, Cobalt samarium strontium oxide CoSm0.5Sr0.5O3, oxygen-deficient 64417-98-7, Yttrium zirconium oxide 106830-29-9, Yttrium zirconium oxide Y0.2Zr0.9O2.1 108916-22-9D, Lanthanum manganese strontium oxide La0.8MnSr0.2O3, oxygen-deficient 111569-09-6, Scandium zirconium oxide 114168-16-0, Tz-8y 116036-94-3D, Iron lanthanum nickel oxide Fe0.4LaNi0.6O3, oxygen-deficient 141588-91-2D, Lanthanum manganese strontium oxide La0.45MnSr0.55O3, oxygen-deficient 157975-55-8D, Lanthanum manganese strontium oxide La0.65MnSr0.3O3, oxygen-deficient 181530-05-2D, Cobalt iron lanthanum strontium oxide Co0.6Fe0.4La0.6Sr0.4O3, oxygen-deficient 197160-34-2, Cerium gadolinium oxide Ce0.8Gd0.4O2.2 235428-75-8D, Cerium manganese strontium oxide Ce0.3MnSr0.7O3, oxygen-deficient 252913-17-0, Gallium lanthanum magnesium strontium oxide Ga0.85La0.8Mg0.15Sr0.2O2.8 321909-12-0D, Lanthanum manganese strontium oxide (La0-0.95Mn0.95-1.15Sr0.05-1.03), oxygen-deficient 321909-14-2D, Cobalt lanthanum strontium oxide (CoLa0-0.9Sr0.1-1.03), oxygen-deficient 321909-15-3D, Cobalt iron strontium oxide (Co0.7-0.8Fe0.2-0.3SrO3), oxygen-deficient 321981-55-9, Cr5Fe1Y

RL: TEM (Technical or engineered material use); USES (Uses)
 (substrate; structures and fabrication techniques for solid
 state **electrochem.** devices)

IT 1314-23-4, Zirconia, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (yttria-stabilized, **substrate**; structures and fabrication
 techniques for solid state **electrochem.** devices)

IT 1314-36-9, Yttria, uses 12060-08-1, Scandia
 RL: TEM (Technical or engineered material use); USES (Uses)
 (zirconia stabilized with, **substrate**; structures and
 fabrication techniques for solid state **electrochem.** devices)

IT 25805-17-8, XUS 40303.00
 RL: TEM (Technical or engineered material use); USES (Uses)
 (binder; structures and fabrication techniques for solid state
electrochem. devices)

RN 25805-17-8 HCAPLUS

CN Oxazole, 2-ethyl-4,5-dihydro-, homopolymer (CA INDEX NAME)

CM 1

CRN 10431-98-8

CMF C5 H9 N O



IT 12611-79-9, AISI 410
 RL: TEM (Technical or engineered material use); USES (Uses)
 (substrate, composite with ceramic; structures and
 fabrication techniques for solid state **electrochem.** devices)

RN 12611-79-9 HCAPLUS

CN Iron alloy, base, Fe 84-88, Cr 11.50-13.50, Mn 0-1.00, Si 0-1.00, C 0-0.15, P
 0-0.040, S 0-0.030 (UNS S41000) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	84 - 88	7439-89-6
Cr	11.50 - 13.50	7440-47-3
Mn	0 - 1.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.15	7440-44-0
P	0 - 0.040	7723-14-0
S	0 - 0.030	7704-34-9

RETABLE

Referenced Author (RAU)	Year	VOL	PG	Referenced Work (RWK)	Referenced File
	(REFY)	(RVL)	(RPG)		
Cable	1996			US 5589285 A	HCAPLUS
Kawasaki	1996			US 5480739 A	HCAPLUS
Wallin	1997			US 5670270 A	HCAPLUS

L93 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
 RN 2000:271877 HCAPLUS
 DN 132:281631
 T1 Fuel cell system for low pressure operation

IN Cisar, Alan J.; Weng, Dacong; Murphy, Oliver J.
 PA Lynntech, Inc., USA
 SO U.S., 31 pp., Cont.-in-part of U.S. 5,709,961.
 CODEN: USXXAM

DT Patent
 LA English
 FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6054228	A	20000425	US 1997-926547	19970910 <--
	US 5709961	A	19980120	US 1996-656968	19960606 <--
	WO 9934467	A2	19990708	WO 1998-US9221	19980910 <--
	WO 9934467	A3	19991111		
	W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW				
	RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FT, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CH, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	AU 9894858	A	19990719	AU 1998-94858	19980910 <--
	EP 1025605	A2	20000809	EP 1998-948243	19980910 <--
	EP 1025605	B1	20030716		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE				
	AT 245311	T	20030815	AT 1998-948243	19980910 <--
	EP 1339120	A2	20030827	EP 2003-11855	19980910 <--
	EP 1339120	A3	20070725		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE				
	ES 2198754	T3	20040201	ES 1998-948243	19980910 <--
	US 6410180	B1	20020625	US 2000-523910	20000313 <--
	US 2002195335	A1	20021226	US 2002-119380	20020409 <--
	US 6733913	B2	20040511		
	US 2002192523	A1	20021219	US 2002-151692	20020518 <--
	US 6852437	B2	20050208		
	US 2005130007	A1	20050616	US 2004-983450	20041108 <--
	US 7078361	B2	20060718		
FRAI	US 1996-656968	A2	19960606	<--	
	US 1997-926547	A	19970910	<--	
	EP 1998-948243	A3	19980910	<--	
	WO 1998-US9221	W	19980910	<--	
	US 2000-523910	A3	20000313	<--	
	US 2002-119380	A1	20020409	<--	
	US 2002-151692	A1	20020518	<--	
AB	An improved fuel cell design for use at low pressure has a reduced number of component parts to reduce fabrication costs, as well as a simpler design that permits the size of the system to be reduced at the same time as performance is being improved. In the present design, an adjacent anode and cathode pair are fabricated using a common conductive element, with that conductive element serving to conduct the current from one cell to the adjacent one. This produces a small and simple system suitable for operating with gas fuels or alternatively directly with liquid fuels, such as methanol, dimethoxymethane, or trimethoxymethane. The use of these liquid fuels permits the storage of more energy in less volume while at the same time eliminating the need for handling compressed gases which further simplifies the fuel cell system. The elec. power output of the design of this invention can be further increased by adding a passage for cooling the stack through contact with a coolant.				
IC	ICM H01M0008-24				

INCL 429018000

- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
- ST **fuel cell** system low pressure operation
- IT **Perfluoro** compounds
 RL: DEV (Device component use); USES (Uses)
 (carboxylic acids, **polymers**; **fuel cell**
 system for low pressure operation)
- IT Catalysts
 (electrocatalysts; **fuel cell** system for
 low pressure operation)
- IT **Polyoxyalkylenes**, uses
 RL: DEV (Device component use); TEM (Technical or engineered material
 use); USES (Uses)
 (fluorine- and sulfo-containing, **ionomers**;
fuel cell system for low pressure operation)
- IT **Polyoxyalkylenes**, uses
 RL: DEV (Device component use); TEM (Technical or engineered material
 use); USES (Uses)
 (fluorine-containing, **sulfo**-containing, **ionomers**;
fuel cell system for low pressure operation)
- IT Cation exchange membranes
Conducting polymers
Fuel cells
 Solders
 (fuel cell system for low pressure operation)
- IT Carbon black, uses
 Carbon fibers, uses
 Epoxy resins, uses
Fluoropolymers, uses
Polymers, uses
Polysiloxanes, uses
 Urethanes
 RL: DEV (Device component use); USES (Uses)
 (fuel cell system for low pressure operation)
- IT Alcohols, uses
 RL: RCT (Reactant); TEM (Technical or engineered material use); RACT
 (Reactant or reagent); USES (Uses)
 (fuel cell system for low pressure operation)
- IT Carbon fibers, uses
 RL: DEV (Device component use); USES (Uses)
 (graphite, cloth; **fuel cell** system for low pressure
 operation)
- IT Metals, uses
 RL: DEV (Device component use); USES (Uses)
 (mesh; **fuel cell** system for low pressure operation)
- IT Wires
 (metal, weave; **fuel cell** system for low pressure
 operation)
- IT Foams
 (metal; **fuel cell** system for low pressure
 operation)
- IT Carboxylic acids, uses
 RL: DEV (Device component use); USES (Uses)
 (**perfluoro**, **polymers**; **fuel cell**
 system for low pressure operation)
- IT **Sulfonic acids**, uses
Sulfonic acids, uses
 RL: DEV (Device component use); USES (Uses)
 (**perfluoro**; **fuel cell** system for low

- pressure operation)
- IT **Fluoropolymers, uses**
Fluoropolymers, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polyoxyalkylene-, sulfo-containing, ionomers
 ; fuel cell system for low pressure operation)
- IT **Ionomers**
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polyoxyalkylenes, fluorine- and sulfo
 -containing; fuel cell system for low pressure
 operation)
- IT **Perfluoro compounds**
Perfluoro compounds
 RL: DEV (Device component use); USES (Uses)
 (sulfonic acids; fuel cell system for low
 pressure operation)
- IT **Imides**
Imides
Sulfonic acids, uses
Sulfonic acids, uses
 RL: DEV (Device component use); USES (Uses)
 (sulfonimides, perfluoro, polymers;
 fuel cell system for low pressure operation)
- IT **Plastics, uses**
 RL: DEV (Device component use); USES (Uses)
 (thermoplastics; fuel cell system for low pressure
 operation)
- IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (foam; fuel cell system for low pressure operation)
- IT 7429-90-5, Aluminum, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium,
 uses 7440-32-6, Titanium, uses 7440-44-0, Carbon, uses 7440-50-8,
 Copper, uses 9002-84-0, Ptfе 12597-68-1, **Stainless**
steel, uses 13598-36-2D, Phosphonic acid, **perfluoro**
 derivs., **polymers**
 RL: DEV (Device component use); USES (Uses)
 (fuel cell system for low pressure operation)
- IT 162774-80-3, Nafion 105 163294-14-2,
Nafion 112
 RL: DEV (Device component use); TEM (Technical or engineered material
 use); USES (Uses)
 (fuel cell system for low pressure operation)
- IT 60-29-7, Ether, uses 67-56-1, Methanol, uses 109-87-5,
 Dimethoxymethane 149-73-5, Trimethoxymethane 1333-74-0, Hydrogen, uses
 RL: RCT (Reactant); TEM (Technical or engineered material use); RACT
 (Reactant or reagent); USES (Uses)
 (fuel cell system for low pressure operation)
- IT 7440-05-3, Palladium, uses 7440-06-4, **Platinum**, uses
 7440-18-8, Ruthenium, uses 7440-57-5, Gold, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (plating; fuel cell system for low
 pressure operation)
- IT 9002-93-1, Triton x 100
 RL: TEM (Technical or engineered material use); USES (Uses)
 (surfactant; fuel cell system for low
 pressure operation)
- IT 12597-68-1, **Stainless steel**, uses
 RL: DEV (Device component use); USES (Uses)

(fuel cell system for low pressure operation)
 RN 12597-68-1 HCAPLUS
 CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 162774-80-3, Nafion 105 163294-14-2,
 Nafion 112
 RL: DEV (Device component use); TEM (Technical or engineered material
 use); USES (Uses)

(fuel cell system for low pressure operation)
 RN 162774-80-3 HCAPLUS
 CN Nafion 105 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RN 163294-14-2 HCAPLUS
 CN Nafion 112 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE	Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Anon		1996			DE 4443945 C1	HCAPLUS
Binder		1974			US 3854994	
Cisar		1998			US 5706961	
Dhar		1993			US 5242764	HCAPLUS
Iwata, T		1994			JP 06243879	HCAPLUS
Johnson		1998			US 5840438	HCAPLUS
Ledjeff		1999			US 5861221	HCAPLUS
Ledjeff		1999			US 5863672	HCAPLUS
Leonard, T		1994			WO 9425991	HCAPLUS
Niedrach		1964			US 3134697	HCAPLUS
Niedrach		1967			US 3297484	HCAPLUS
Niedrach		1969			US 3432355	
Nishida		1997			US 5686197	HCAPLUS
Raistrick		1989			US 4876115	HCAPLUS
Rao		1991			US 5053375	HCAPLUS
Rogers		1982			US 4364805	HCAPLUS
Rohr		1992			US 5171646	
Rowe		1980			US 4235693	HCAPLUS
Spear		1999			US 5863671	HCAPLUS
Surampudi		1997			US 5599638	HCAPLUS
Sweeney		1986			US 4596648	HCAPLUS
Tocker		1967			US 3297485	
Watanabe		1993			US 5246792	HCAPLUS
Yamada		1994			US 5364711	HCAPLUS

L93 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:85138 HCAPLUS

DN 132:110644

TJ Fuel cell with polymer electrolyte
 membrane

IN Zedda, Mario; Heinzl, Angelika; Nolte, Roland

PA Fraunhofer-Gesellschaft Zur Forderung Der Angewandten Forschung E.V.,
 Germany

SO PCT Int. Appl., 28 pp.

CODEN: PIXXD2

PT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FI	WO 2000005776	A1	20000203	WO 1999-EP5146	19990720 <--
	W: US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	DE 19833064	A1	20000203	DE 1998-19833064	19980722 <--
	DE 19833064	C2	20011011		
	EP 1105932	A1	20010613	EP 1999-941445	19990720 <--
	EP 1105932	B1	20060614		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY				
	AT 330333	T	20060715	AT 1999-941445	19990720 <--
PRAI	DE 1998-19833064	A	19980722	<--	
	WO 1999-EP5146	W	19990720	<--	
AB	The invention relates to a fuel cell for high output voltages, consisting of a flat system of at least two individual fuel cells positioned in a housing which each have an electrolyte membrane coated with electrodes to serve as an anode and cathode. The consecutive, adjacent individual cells are elec. connected in series in that the anode of an individual cell is connected with the cathode of the adjacent individual cell via an elec. conductive transverse structure . In its surface plane the transverse conducting structure in the intermediate area is impermeable to the fuel and the electrolyte membranes of the adjacent individual cells extend into the intermediate area between the individual cells, overlap each other and cover the transverse conducting structure in a sealing manner from one side each.				
IC	ICM H01M0008-24				
	ICS H01M0008-10				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
	Section cross-reference(s): 38				
ST	fuel cell polymer electrolyte membrane				
IT	Cation exchange membranes				
	Fuel cell electrolytes				
	Fuel cells				
	Polymer electrolytes				
	(fuel cell with polymer electrolyte membrane)				
IT	Fluoropolymers, uses				
	Polybenzimidazoles				
	Polysulfones, uses				
	RL: TEM (Technical or engineered material use); USES (Uses)				
	(fuel cell with polymer electrolyte membrane)				
IT	Polyketones				
	Polyketones				
	Polysulfones, uses				
	Polysulfones, uses				
	RL: TEM (Technical or engineered material use); USES (Uses)				
	(polyether-; fuel cell with polymer electrolyte membrane)				
II	Polyethers, uses				
	Polyethers, uses				
	RL: TEM (Technical or engineered material use); USES (Uses)				
	(polyketone-; fuel cell with polymer electrolyte membrane)				
IT	Polyethers, uses				

Polyethers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(polysulfone-; fuel cell with

polymer electrolyte membrane)

IT Fuel gas manufacturing

(reforming; fuel cell with polymer

electrolyte membrane)

IT 7440-32-6, Titanium, uses 7440-44-0, Carbon, uses 12597-68-1,

Stainless steel, uses

RL: DEV (Device component use); USES (Uses)

(fuel cell with polymer

electrolyte membrane)

IT 67-56-1, Methanol, uses

RL: RCT (Reactant); TEM (Technical or engineered material use); RACT

(Reactant or reagent); USES (Uses)

(fuel cell with polymer

electrolyte membrane)

IT 1333-74-0P, Hydrogen, uses

RL: SPN (Synthetic preparation); TEM (Technical or engineered material

use); PREP (Preparation); USES (Uses)

(fuel cell with polymer

electrolyte membrane)

IT 9002-84-0, Ptfе 9002-88-4, Polyethylene 9003-07-0,

Polypropylene 9003-53-6, Polystyrene

RL: TEM (Technical or engineered material use); USES (Uses)

(fuel cell with polymer

electrolyte membrane)

IT 12597-68-1, Stainless steel, uses

RL: DEV (Device component use); USES (Uses)

(fuel cell with polymer

electrolyte membrane)

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 9002-88-4, Polyethylene

RL: TEM (Technical or engineered material use); USES (Uses)

(fuel cell with polymer

electrolyte membrane)

RN 9002-88-4 HCAPLUS

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1

CMF C2 H4

H2C=CH2

RETABLE

Referenced Author (RAU)	Year [:RPY]	VOL [:(RVL)]	PG [:(RPG)]	Referenced Work (RWK)	Referenced File
Fraunhofer Ges Forschun	1996	1		DE 19502391 C	HCAPLUS
Fraunhofer Ges Forschun	1996	1		IWO 9618216 A	HCAPLUS
Fraunhofer Ges Forschun	1996	1		IWO 9618217 A	HCAPLUS
Gore & Ass	1998	1		IWO 9816963 A	HCAPLUS
Mitsubishi Electric Cor	1986	1		IJP 61121265 A	HCAPLUS

Mitsubishi Heavy Ind Ltd 1993 ; | | JP 05041221 A |
 Sanyo Electric Co Ltd 1993 | | | JP 05325993 A |

L93 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 1998:627972 HCAPLUS
 DN 130:18276
 TI Development of solid **polymer electrolyte water**
electrolyzer with 200 cm² 5-cell
 AU Nakanori, Takahiro; Okisawa, Kayoko; Yamaguchi, Mikimasa
 CS New Energy Laboratory, Fuji Electric Corporate Research and Development,
 Ltd., Yokosuka City, 240-01, Japan
 SO Proceedings of the Intersociety Energy Conversion Engineering Conference (
 1998), 33rd, IECECI13/1-IECECI13/6
 CODEN: PTECDE; ISSN: 0146-955X
 PB Society of Automotive Engineers
 DT Journal; (computer optical disk)
 LA English
 AB Fuji Elec. Corporate Research and Development, Ltd. was
 developing technologies for high performance solid **polymer**
electrolyte water electrolyzers in national project
 WE-NET. In term of tech. features, Fuji Elec.'s technol.
 approach calls for membrane-**electrode** assemblies to be formed by
 a hot-press method. The authors have manufactured a 200. cm² membrane-
electrode assemblies by the hot-press method, and have developed a
 5-cell stack with the 200 cm² membrane-**electrode** assembly, that
 registered 7.850 V of stack voltage and 93.2% of energy efficiency at 1
 A/cm² and at 80° under atmospheric pressure. And at 5 A/cm² of high c.d.,
 the stack registered 9.308 V of stack voltage and 79.7% of energy
 efficiency at 90°.
 CC 72-9 (Electrochemistry)
 Section cross-reference(s): 49, 52
 ST solid **polymer electrolyte water electrolyzer**
 ; membrane cell solid **polymer electrolyte water**;
perfluorosulfonic acid polymer membrane cell water
 IT **Electrodeposits**
 (cathode support collector from sintered stainless fiber plate
electroplated with gold and anode support collector from
 sintered titanium fiber plate **electroplated** with
 platinum for solid **polymer electrolyte**
 water **electrolyzer**)
 IT Power
 (consumption for solid **polymer electrolyte water**
electrolyzer with 200 cm² 5-cell)
 IT **Electrolytic cells**
 (membrane; solid **polymer electrolyte water**
electrolyzer with 200 cm² 5-cell)
 IT **Sulfonic acids, uses**
 RL: DEV (Device component use); PRP (Properties); USES (Uses)
 (**perfluorosulfonic acid polymers**; development of
 solid **polymer electrolyte water**
electrolyzer with 200 cm² 5-cell)
 IT **Metallic fibers**
 RL: DEV (Device component use); PRP (Properties); USES (Uses)
 (stainless steel; cathode support collector from
 sintered stainless fiber plate
electroplated with gold for solid **polymer**
electrolyte water electrolyzer with 200 cm² 5-cell)
 IT **Fluoropolymers, uses**
Fluoropolymers, uses
 RL: DEV (Device component use); PRP (Properties); USES (Uses)

(sulfo-containing; development of solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)

IT Metallic fibers
 RL: DEV (Device component use); PRP (Properties); USES (Uses)
 (titanium; anode support collector from sintered titanium fiber
plate electroplated with **platinum** for solid
polymer electrolyte water **electrolyzer** with
 200 cm2 5-cell)

IT Ion exchange membranes
 (water **electrolyzer** with 200 cm2 5-cell with)

IT 7440-32-6, Titanium, uses
 RL: DEV (Device component use); PRP (Properties); USES (Uses)
 (anode support collector from sintered titanium fiber **plate**
electroplated with **platinum** for solid **polymer**
electrolyte water **electrolyzer** with 200 cm2 5-cell)

IT 7440-06-4, Platinum, uses
 RL: CAT (Catalyst use); DEV (Device component use); PEP (Physical,
 engineering or chemical process); PROC (Process); USES (Uses)
 (catalyst in solid **polymer electrolyte** water
electrolyzer with 200 cm2 5-cell)

IT 12030-49-8P, Iridium dioxide
 RL: CAT (Catalyst use); PNU (Preparation, unclassified); PREP
 (Preparation); USES (Uses)
 (catalyst in solid **polymer electrolyte** water
electrolyzer with 200 cm2 5-cell)

IT 7440-57-5, Gold, uses 12597-68-1, Stainless
steel, uses
 RL: DEV (Device component use); PEP (Physical, engineering or chemical
 process); PROC (Process); USES (Uses)
 (cathode support collector from sintered **stainless fiber**
plate electroplated with gold for solid
polymer electrolyte water **electrolyzer** with
 200 cm2 5-cell)

IT 7732-18-5, Water, processes
 RL: PEP (Physical, engineering or chemical process); PROC (Process)
 (**electrolysis**; solid **polymer electrolyte**
 water **electrolyzer** with 200 cm2 5-cell)

IT 7732-18-5, Water, properties
 RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)
 (solid **polymer electrolyte electrolyzer**
 with 200 cm2 5-cell for **electrolysis** of)

IT 1333-74-0P, Hydrogen, properties 7782-44-7P, Oxygen, properties
 RL: PNU (Preparation, unclassified); PRP (Properties); PREP (Preparation)
 (solid **polymer electrolyte** water
electrolyzer with 200 cm2 5-cell for preparation of)

IT 12597-68-1, Stainless steel, uses
 RL: DEV (Device component use); PEP (Physical, engineering or chemical
 process); PROC (Process); USES (Uses)
 (cathode support collector from sintered **stainless fiber**
plate electroplated with gold for solid
polymer electrolyte water **electrolyzer** with
 200 cm2 5-cell)

RN 12597-68-1 HCAPLUS
 CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	Referenced
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File

```

Nakanori, T      |1997 |      |126 |Proceeding of the 4t|
Nakanori, T      |      |      |191 |Proceeding of the 64|
Yamaguchi, M     |1995 |95   |205 |International Hydrog|
Yamaguchi, M     |1997 |      |1958|Proceeding of the 32|HCAPLUS

```

L93 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1996:588645 HCAPLUS

DN 125:226512

TI Method for sealing solid polymer electrolyte
fuel cells

IN Seki, Tsutomu

PA Tokyo Gas Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 08185875	A	19960716	JP 1994-339776	19941228 <--
PRAI	JP 1994-339776		19941228	<--	
AB	In the sealing of the fuel cells using polymer electrolyte membranes joined to separators by a binder, the electrolyte membrane and the separator are pressed, without drying the binder, in a $\geq 100^\circ$ bath to join the electrolyte membrane in a hydrated form to the separator. The electrolyte is preferably a perfluorocarbon sulfonic acid membrane, the separator is C or noble metal plated stainless steel, and the binder is a thermoplastic polymer.				
IC	ICM H01M0008-02				
	ICS H01M0008-10				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	fuel cell polymer electrolyte membrane sealing; separator polymer electrolyte sealing fuel cell				
IT	Fuel-cell electrolytes (sealing of polymer electrolyte membranes and platinum coated stainless steel separators with thermoplastic binders for for fuel cells)				
IT	Rubber, silicone, uses RL: NUU (Other use, unclassified); USES (Uses) (thermoplastic binders for sealing polymer electrolyte membranes and platinum coated stainless steel separators for fuel cells)				
IT	Fuel cells (separators, sealing of polymer electrolyte membranes and platinum coated stainless steel separators with thermoplastic binders for for fuel cells)				
IT	66796-30-3, Nafion 117 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses) (method for sealing Nafion 117 solid polymer electrolyte membranes and separators for fuel cells)				
IT	12597-68-1, Stainless steel, uses				

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (method for sealing **polymer electrolyte** membranes
 and **platinum coated stainless**
steel separators for fuel cells)

IT 7440-06-4, **Platinum**, uses

RL: MOA (Modifier or additive use); USES (Uses)
 (method for sealing **polymer electrolyte** membranes
 and **platinum coated stainless**
steel separators for fuel cells)

IT 66796-30-3, **Nafion 117**

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (method for sealing **Nafion 117** solid **polymer**
electrolyte membranes and separators for fuel
 cells)

RN 66796-30-3 HCAPLUS

CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 12597-68-1, **Stainless steel**, uses

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (method for sealing **polymer electrolyte** membranes
 and **platinum coated stainless**
steel separators for fuel cells)

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1996:455524 HCAPLUS

UN 125:152968

TI Tritium enrichment by **electrolysis** using solid **polymer**
electrolyte

AU Dematsu, Kazuyoshi; Yamazaki, Hisashi; Sato, Mineo

CS Fac. Eng., Niigata Univ., Niigata, 950-21, Japan

SO Radioisotopes (1996), 45(6), 375-377

CODEN: RAISAB; ISSN: 0033-8303

PB Nippon Aisotopu Kyokai

DT Journal

LA Japanese

AB An ion exchange membrane (du Pont **Nafion 117**) was sandwiched with metal **electrodes** of 100 mesh nets of Ni, Cu or SUS 304 **stainless steel** or 80 mesh nets of Pt. Both sides of the **electrode** assembly was reinforced with 20 mesh Ti nets. The assembly was set in an **electrolytic cell** and 12 cm³ of water containing 110-140 BqT/cm³ was **electrolyzed** to 2 cm³. Radioactivity of T was counted with a liquid scintillation counter. On **electrolysis** with Ni **electrodes** at 3 V, the separation factor β of T, the ratio of T concentration before and after **electrolysis**, increased from 7.2 at 40° to 22.9 at 1°. **Deposition** of Ni, which was dissolved from the anode, was found near the cathode after the **electrolysis**. The combination of Ni-Ni as an anode and a cathode gave β of 15.2 at 5° but the combinations of Pt-Ni, Pt-Cu, Pt-Pt and Pt-SUS 304 resulted in β of 6-7.

CC 71-6 (Nuclear Technology)

Section cross-reference(s): 72

ST tritium sepn electrolysis solid electrolyte;
enrichment tritium electrolysis

IT **Electrolytes**
Isotope separation
(tritium enrichment by electrolysis using solid
polymer electrolyte)

IT 7440-02-0, Nickel, uses 7440-06-4, Platinum, uses 7440-50-8,
Copper, uses 11109-50-5, SUS 304
RL: DEV (Device component use); USES (Uses)
(electrode; tritium enrichment by electrolysis
using solid polymer electrolyte)

IT 66796-30-3, Nafion 117
RL: DEV (Device component use); USES (Uses)
(tritium enrichment by electrolysis using solid
polymer electrolyte)

IT 10028-17-8P, Tritium, processes
RL: PEP (Physical, engineering or chemical process); SPN (Synthetic
preparation); PREP (Preparation); PROC (Process)
(tritium enrichment by electrolysis using solid
polymer electrolyte;

IT 11109-50-5, SUS 304
RL: DEV (Device component use); USES (Uses)
(electrode; tritium enrichment by electrolysis
using solid polymer electrolyte)

RN 11109-50-5 HCAPLUS

CN Iron alloy, base, Fe 66-74, Cr 18.00-20.00, Ni 8.00-10.50, Mn 0-2.00, Si
0-1.00, C 0-0.08, P 0-0.045, S 0-0.030 (UNS S30400) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 74	7439-89-6
Cr	18.00 - 20.00	7440-47-3
Ni	8.00 - 10.50	7440-02-0
Mn	0 - 2.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.08	7440-44-0
P	0 - 0.045	7723-14-0
S	0 - 0.030	7704-34-9

IT 66796-30-3, Nafion 117
RL: DEV (Device component use); USES (Uses)
(tritium enrichment by electrolysis using solid
polymer electrolyte)

RN 66796-30-3 HCAPLUS

CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1991:453420 HCAPLUS

DN 115:53420

TI Stacked batteries

IN Yanagisawa, Nobuhiro; Yoneda, Tetsuya; Minamino, Mitsuharu

PA Sharp Corp., Japan

30 Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FI	JP 03008256	A	19910116	JP 1989-141575	19890602 <--
PRAI	JP 1989-141575		19890602 <--		
AB	The batteries have a stack of unit cells of a cathode, an electrolyte-containing separator, and an anode, and elec. conductive layers among the cells in a sealed battery case, whose inside is coated with an elec. insulator polymer layer. Stacked H-absorbing TiNi-MnO ₂ batteries using polyethylene spray-coated stainless steel cases had higher volume efficiency than batteries using polyethylene tubes as insulator.				
IC	ICM H01M0002-02				
CC	ICS H01M0006-12; H01M0010-34				
ST	52-2 (Electrochemical, Radiational, and Thermal Energy Technology) hydrogen manganese battery case coating ; battery stainless steel case coating ; polyethylene spray coating battery case				
IT	Batteries , secondary (sealed, hydrogen-manganese dioxide, with polyethylene spray-coated stainless steel cases, for high efficiency)				
IT	9002-88-4, Polyethylene RL: USES (Uses) (battery cases from stainless steel spray-coated with)				
IT	12597-68-1, Stainless steel , uses and miscellaneous RL: USES (Uses) (battery cases, polyethylene spray-coated)				
IT	9002-88-4, Polyethylene RL: USES (Uses) (battery cases from stainless steel spray-coated with)				
RN	9002-88-4 HCAPLUS				
CN	Ethene, homopolymer (CA INDEX NAME)				
	CM	1			
	CRN	74-85-1			
	CMF	C2 H4			

H₂C=CH₂

IT **12597-68-1, Stainless steel**, uses and miscellaneous
RL: USES (Uses)
(**battery** cases, **polyethylene spray-coated**)

RN **12597-68-1 HCAPLUS**
CN **Stainless steel** (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 21 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1987:206276 HCAPLUS**
CN **106:206276**

TI Electrically conductive circuit substrates

IN Tachibana, Kazuhiro

PA Nissha Printing Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 16 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FI	JF 62804388	A	19870110	JP 1985-143382	19850629 <--
PRAI	JP 1985-143382		19850629	<--	

AB A method for forming an **elec. conductive circuit substrate** involves: (1) attaching a thin plastic sheet to a vertical or near-vertical cross-section of laminated **elec. conductive** and **polymeric** foils; (2) forming an **electrode** facing the sheet, and filling the space between the sheet and **electrode** with a liquid or pastelike **electrolytic solution** from a hetero-atom-containing aromatic compound, a strong **electrolyte**, and a polar organic solvent containing no active H atoms; (3) applying **elec. current** between the **conductive foil** and **electrode** to **electrolytically** form a circuit pattern on the sheet; and (4) separating the patterned sheet from the cross-section and **electrolytic solution**. The method can mass produce the circuit **substrates**.

IC ICM H05K0003-18

ICS C25D0007-00; C25D0013-00; C25D0013-08;

H01B0005-14; H01H0011-04

CC 76-2 (Electric Phenomena)

Section cross-reference(s): 38, 72

ST **conductive elec circuit substrate**;

electrolysis circuit substrate formation

IT **Electric conductors**

(**circuit substrates**, manufacture of, by **electrolysis**)

IT **Electrolysis**

(in **elec. conductive circuit substrate** manufacture)

IT **Polysulfones, uses and miscellaneous**

RL: USES (Uses)

(sheets from, **elec. conductive circuit substrates** containing)

IT **Electric circuits**

(**substrate** manufacture for)

IT **Polyimides, uses and miscellaneous**

RL: USES (Uses)

(**polyamide-**, sheets from, **elec. conductive circuit substrates** containing)

IT **Polyamides, uses and miscellaneous**

RL: USES (Uses)

(**polyimide-**, sheets from, **elec. conductive circuit substrates** containing)

IT 9003-47-8, **Polyvinylpyridine** 25233-30-1, **Polyaniline**

27290-25-1 30604-76-3 89298-10-2 89298-12-4 89298-16-8

RL: USES (Uses)

(**elec. conductive circuit substrates** containing)

IT 51-17-2, **Benzimidazole** 75-05-8, **Acetonitrile**, uses and miscellaneous

108-32-7 109-97-7, **Pyrrrol** 110-00-9, **Furan** 110-02-1, **Thiophene**

110-71-4, **Dimethoxyethane** 1923-70-2, **Tetrabutylammonium perchlorate**

3109-63-5, Tetrabutylammonium hexafluorophosphate 7631-86-9,
Silica, uses and miscellaneous 7782-42-5, Graphite, uses and
miscellaneous 7791-03-9, Lithium perchlorate 15780-02-6,
Tetrapropylammonium perchlorate 21324-40-3, Lithium
hexafluorophosphate 22505-56-2 62258-61-1 81901-10-2
RL: USES (Uses)

(in elec. conductive circuit substrate
manufacture)

IT 7440-02-0, Nickel, uses and miscellaneous 7440-06-4, Platinum,
uses and miscellaneous 7440-50-8, Copper, uses and miscellaneous
9002-84-0, Polytetrafluoroethylene 9002-85-1,
Polyvinylidenechloride 9002-86-2, Polyvinylchloride
9002-88-4, Polyethylene 9003-07-0,
Polypropylene 9003-53-6 12597-68-1, Stainless
steel, uses and miscellaneous 24937-79-9,
Polyvinylidenefluoride 24968-12-5, Polybutylene
terephthalate 24981-14-4, Polyvinylfluoride 25014-41-9,
Polyacrylonitrile 25038-54-4, Nylon 6, uses and miscellaneous
25038-59-9, Polyethylene terephthalate, uses and miscellaneous
32131-17-2, Nylon 66, uses and miscellaneous

RL: USES (Uses)

(sheets from, elec. conductive circuit
substrates containing)

IT 9002-88-4, Polyethylene 12597-68-1,
Stainless steel, uses and miscellaneous

RL: USES (Uses)

(sheets from, elec. conductive circuit
substrates containing)

RN 9002-88-4 HCAPLUS

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1

CMF C2 H4

H2C=CH2

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1986:522877 HCAPLUS

DN 105:122877

TI Protective properties of metallic and metal-polymer
coatings

AU Kupriyanov, I. L.; Korotkina, M. N.; Ivashko, V. S.; Verstak, A. A.;
Sokhadze, V. Sh.

CS Beloruss. Resp. Nauchno-Proizvod. Ob'edin. Poroshk. Metall., Minsk, USSR

SD Zashchita Metallov (1986), 22(4), 551-4

CODEN: ZAMEA9; ISSN: 0044-1856

ET Journal

LA Russian

AB Electrochem. methods were used to evaluate the protective
properties of spray coatings of stainless
steel clad, for example, with a high-pressure modified

polyethylene film. The **polymer** film, plastically filling the continuous **pores** of the metallic layer, provides effective protection and high corrosion resistance of the material even in the case of damage to the outer **polymer** layer. The **steel** St.3 [39296-41-8] was spray-coated with the metal to a thickness of 0.1-0.4 mm and with the **polymers** to 0.2 mm. The **steel coating** was Kh18N9TYu [104234-05-1] and the **polymers** were Pentaplast [26917-50-0] and high-pressure **polyethylene** [9002-88-4].

CC 72-6 (Electrochemistry)
 Section cross-reference(s): 38, 42, 55
 ST protective **coating metal polymer**; corrosion prevention
steel polymer coating
 IT Coating materials
 (metallic and metal-**polymer**, protective properties of)
 IT **Electrolytic** polarization
 (of **steel coated** with metals or metal-
polymer coatings in sulfate solns.)
 IT 9002-88-4 26917-50-0
 RL: PRP (Properties)
 (coatings of, with metal, protective properties of)
 IT 104234-05-1
 RL: PRP (Properties)
 (coatings of, with **polymer**, protective properties
 of)
 IT 39296-41-8, reactions
 RL: PEP (Physical, engineering or chemical process); PROC (Process)
 (corrosion of, metallic and metal-**polymer coatings**
 in prevention of)
 IT 7664-93-9, properties 7783-20-2, properties
 RL: PRP (Properties)
 (electrolytic polarization of **steel coated**
 with metals or metal-**polymer coatings** in
 solution containing)
 IT 9002-88-4
 RL: PRP (Properties)
 (coatings of, with metal, protective properties of)
 RN 9002-88-4 HCAPLUS
 CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1

CMF C2 H4

H2C=CH2

L93 ANSWER 23 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
 RN 1981:451801 HCAPLUS
 DN 95:51801
 TI Cell for **electrolysis** of brines for producing chlorine
 IN Dubois, Donald Wayne; Darlington, William Bruce
 PA PPG Industries, Inc., USA
 SO Ger. Offen., 32 pp.
 CODEN: GWXXBX
 DT **Patent**
 LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FI	DE 3041844	A1	19810527	DE 1980-3041844	19801106 <--
	DE 3041844	C2	19870319		
	US 4342629	A	19820803	US 1979-76898	19791108 <--
	US 4315805	A	19820216	US 1980-120217	19800211 <--
	NL 8005092	A	19810601	NL 1980-5092	19800910 <--
	SE 8006868	A	19810509	SE 1980-6868	19801101 <--
	NO 8002980	A	19810511	NO 1980-2980	19801037 <--
	JP 56075585	A	19810622	JP 1980-154736	19801105 <--
	JP 56112490	A	19810904	JP 1980-154737	19801105 <--
	FR 2469473	A1	19810522	FR 1980-23765	19801106 <--
	FR 2469473	B1	19851025		
	BE 886072	A1	19810507	BE 1980-202727	19801107 <--
	GB 2063918	A	19810610	GB 1980-35988	19801110 <--
	US 4364815	A	19821221	US 1981-276123	19810622 <--
	US 4448662	A	19840515	US 1983-496031	19830519 <--
	CA 1207277	A2	19860708	CA 1985-475357	19850227 <--
PRAI	US 1979-76898	A	19791108	<--	
	US 1980-120217	A	19800211	<--	
	CA 1980-362980	A3	19801022	<--	
	US 1982-382450	A1	19820524	<--	

AB In this cell a permionic membrane seps. the anode from the cathode. A chlor-alkali cell with a solid **polymer electrolyte** was constructed with a thermoplastic permionic membrane having attached on opposite sides anodic and cathodic catalysts which were on screens. The solid **polymer electrolyte** was made by deposition of Pt black on a foil of Flemion, a perfluorinated hydrocarbon resin with Me ester acid groups. After pressing the **polymer** was boiled in 30% NaOH solution for 24 h. This membrane was used with a Ni-plated stainless steel screen cathode and a RuO₂-TiO₂ coated screen as the anodic catalyst carrier on the uncoated surface of the membrane. Brine was **electrolyzed** at 3.03 V for 50 min.

IC C25B0001-26

CC 72-10 (Electrochemistry)

Section cross-reference(s): 49, 67

ST permionic membrane **electrolytic cell** brine; sodium hydroxide chlorine **electroprodn** brine

IT Brines

(electrolysis of, membrane cells for)

IT **Electrolytic cells**

(diaphragm, for brine electrolysis)

IT 12036-10-1 13463-67-7, uses and miscellaneous

RL: CAT (Catalyst use); USES (Uses)

(catalysts, on anode for brine **electrolysis**)

IT 7440-02-0, uses and miscellaneous

RL: USES (Uses)

(cathodes, from stainless steel screen, for brine **electrolysis**)

IT 1310-73-2P, preparation 7782-50-5P, preparation

RL: PREP (Preparation)

(manufacture of, by brine **electrolysis**, membrane cells for)

IT 75634-46-7

RL: PRP (Properties)

(membranes, for brine **electrolysis**)

IT 75634-46-7

RL: PRP (Properties)

(membranes, for brine **electrolysis**)

RN 75634-46-7 HCAPLUS
 CN Flemion (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

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http://www.stn-international.com/archive/presentations/DWPIAnaVist2_0710.pdf
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L131 ANSWER 1 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2005-103702 [12] WPIX

DNC C2005-034977 [12]

DNN N2005-090002 [12]

TI Manufacture of **electrolyte** for fuel cell used to power motors, lights, computers, or electrical **appliances**, comprises coupling **substrate** to charged **electrode** and **electrodepositioning polymeric electrolyte** on **substrate**

DC A85; L03; X16; X25

IN HERMAN G S; MARDILOVICH P; PUNSALAN D

PA (HERM-I) HERMAN G S; (HEWF-C) HEWLETT-PACKARD DEV CO LP; (MARD-I) MARDILOVICH P; (PUNS-I) PUNSALAN D

CYC 35

PIA EP 1498976 A2 20050119 (200512)* EN 17[7]

JP 2005038858 A 20050210 (200512) JA 13

US 20050014050 A1 20050120 (200512) EN

<--

ADT EP 1498976 A2 EP 2004-253574 20040615; US 20050014050 A1 US

2003-620675 20030715; JP 2005038858 A JP 2004-208178 20040715

PRAI US 2003-620675 20030715

AB EP 1498976 A2 UPAB: 20050708

NOVELTY - Manufacture of an **electrolyte** comprises coupling a **substrate** (250) to a charged **electrode** (240, 270) and **electrodepositioning a polymeric electrolyte** on the **substrate**.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

- (a) an **electrolyte** comprising a **porous substrate**, and a **polymeric electrolyte electrodeposited** within the **porous substrate**;
 - (b) a fuel cell comprising a cathode, an anode and an **electrolyte**;
 - (c) an **electrochemical** apparatus comprising a housing, a fuel cell, and an **electrolyte**; and
 - (d) an **electronic** device comprising an **electrochemical** cell providing power to an electric power consuming apparatus, a fuel source, and a fuel flow path.
- USE - For manufacturing an **electrolyte** for a fuel cell used to power motors, lights, computers, or electrical appliances

ADVANTAGE - The method reduces the likelihood of swelling, increases mechanical stability and reduces the possibility of methanol crossover.

DESCRIPTION OF DRAWINGS - The figure is a cross-sectional view illustrating an **electrodeposition** system.

Negative lead (220)

Charged **electrode** (240, 270)

Substrate (250)

Positive lead (280)

TECH

POLYMERS - Preferred Material: The **polymeric electrolyte** comprises a **perfluorosulfonate ionomer**.

L131 ANSWER 2 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 2005-010039 [01] WPIX
 CR 2004-108521; 2007-395311
 DNC C2005-002815 [01]
 TI Functionalizing a **porous substrate** useful for improving material properties involves flash evaporating a monomer in a vacuum to produce a vapor; and condensing the vapor on the **porous substrate** to produce a film on the **porous substrate**
 DC A82; F06; F09; M13; P42; P73
 IN MIKHAEL M G; YIALIZIS A; MIKHAEL M
 PA (MIKH-I) MIKHAEL M G; (SIGM-N) SIGMA LAB ARIZONA INC; (YIAL-I) YIALIZIS A
 CYC 107
 PIA US 20040213918 A1 20041028 (200501)* EN 16[9]
 WO 2004097846 A2 20041111 (200501) EN
 EP 1618225 A2 20060125 (200606) EN
 CN 1791701 A 20060621 (200612) ZH
 JP 2006524759 W 20061102 (200672) JA 22
 US 20060257642 A9 20061116 (200677) EN
 ADT US 20040213918 A1 Provisional US 2003-465719P 20030425; US 20040213918 A1 US 2004-830608 20040423; CN 1791701 A CN 2004-80011126 20040423; EP 1618225 A2 EP 2004-760361 20040423; WO 2004097846 A2 WO 2004-US12595 20040423; EP 1618225 A2 WO 2004-US12595 20040423; JP 2006524759 W WO 2004-US12595 20040423; JP 2006524759 W JP 2006-513264 20040423; US 20060257642 A9 Provisional US 2002-391864P 20020626; US 20060257642 A9 Provisional US 2003-465719P 20030425; US 20060257642 A9 CIP of US 2003-465399 20030619; US 20060257642 A9 US 2004-830608 20040423
 EDT EP 1618225 A2 Based on WO 2004097846 A; JP 2006524759 W Based on WO 2004097846 A
 PRAI US 2004-830608 20040423
 US 2003-465719P 20030425

US 2002-391864P 20020626

US 2003-465399 20030619

AB US 20040213918 A1 UPAB: 20050707

NOVELTY - Functionalizing (P1) a **porous substrate** to impart a particular functionality involves: flash evaporating a monomer having the functionality in a vacuum chamber to produce a vapor; condensing the vapor on the **porous substrate** to produce a film of the monomer on the **porous substrate**; and curing the film to produce a functionalized **polymeric layer** on the **porous substrate**.

DETAILED DESCRIPTION - Functionalizing (P1) a **porous substrate** to impart a particular functionality to the **substrate** while retaining its permeability, involves: flash evaporating a monomer having the functionality in a vacuum chamber to produce a vapor; condensing the vapor on the **porous substrate** to produce a film of the monomer on the **porous substrate**; and curing the film to produce a functionalized **polymeric layer** on the **porous substrate**. The condensing step is carried out under vapor-density and residence-time conditions that limit the **polymeric layer** to a maximum thickness of about 3 microns. An INDEPENDENT CLAIM is included for a **porous substrate** produced by (P1), where the monomer incorporates a hydrophilic and oleophilic functionality, a hydrophilic **electrostatic** dissipation functionality, a hydrophobic and oleophobic functionality, a color, a biocide functionality, a fire-resistant functionality, a metal-chelating functionality, a proton-conductivity functionality, an ion-conductivity functionality, a pH-sensing functionality, a scent-emission functionality.

USE - For improving material (e.g. paper, membranes, and other woven and non-woven **porous materials**) properties for particular applications.

ADVANTAGE - The method is safe to implement, do not utilize solvents, and do not effect the mechanical and functional properties of the **porous substrate**. The method controls the **surface energy** of the resulting product and introduces hydrophobicity, oleophobicity, hydrophilicity, oleophilicity, fire resistance, biocidity, color, anti-stain, antistatic or sensor properties. The method is economical and cost-effective.

TECH

INORGANIC CHEMISTRY - Preferred Components: The inorganic layer is metals or ceramics (preferably metals to provide electrical conductivity, low-emissivity and **electrostatic** dissipation functionalities).

ORGANIC CHEMISTRY - Preferred Components: The inorganic layer is metals or ceramics (preferably metals to provide electrical conductivity, low-emissivity and **electrostatic** dissipation functionalities).

POLYMERS - Preferred Method: The method further involves pretreating the **substrate** in a plasma field within one second prior to the condensation step; vacuum **depositing** an inorganic layer over the **polymeric layer**; flash evaporating and condensing a second film of monomer on the inorganic layer; and curing the second film to produce a second **polymeric layer** on the inorganic layer. The method further involves: co-**depositing** metallic lithium over the monomer prior to the curing step to provide a **polymer electrolyte** with ion-conductivity functionality. The metal layer provides a low-emissivity functionality. Preferred components: The **porous substrate** comprises a **porous material** selected from **polypropylene**, **polyethylene**, **fluoro-polymers**, **polyester**, nylon, rayon, paper, wool, cotton, glass fibers, carbon fibers, cellulose-based fibers, and metals. The monomer is a **fluorinated monomer** to provide

water and oil repellency functionality. The monomer comprises a color additive, a biocide additive, a brominated monomer to provide a fire retardant functionality, an acrylated acetyl acetate monomer to provide a metal-chelating functionality, a **sulfonic** acid group to provide proton-conductivity functionality. The monomer is functionalized with a functional group selected from hydroxyl, carboxyl, **sulfonic**, amino, amido, or ether to provide a hydrophilic functionality. The **porous substrate** is with increased wet tensile strength; increased chemical resistance; increased abrasion resistance; and reduced friction coefficient; and is with two sides and corresponding opposite functionalities.

ABEX EXAMPLE - A melt-blown **polypropylene** nonwoven fabric was coated with a hydrophilic acrylate **polymer** film functionalized with hydroxyl, carboxyl, **sulfonic**, amino, amido and ether groups (in separate tests) to create a water absorbent **surface**. The monomer was flash evaporated at 10 millitorr. The fabric was pretreated in a plasma field and within one second it was exposed to the monomer vapor for condensation while traveling at a speed of 30 meters/minute. The condensed monomer layer was cured in-line by **electron beam** radiation within 150 milliseconds. A **polymer** coating thickness of 0.1 microns resulted from the run, which was found to provide adequate wettability in all cases by water with a **surface** energy of 70 - 72 dyne/cm. The functionalized fabrics absorbed water while retaining the original permeability of the fabrics. The **coated** materials showed high performance as water absorbent media.

L131 ANSWER 3 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2004-619278 [60] WPIX

DNC C2004-223061 [60]

DNN N2004-489964 [60]

TI Solid **polymer electrolyte** for fuel cell, is mixture containing **polymer** having anionic group, and **polymer** having amide group or alkoxy amide group in principal chain

DC A23; A85; L03; X12; X16

IN KIDAI M; KONO S; TAGUCHI S

PA (TORA-C) TORAY IND INC

CYC 1

PIA JP 2004235051 A 20040819 (200460)* JA 23[5]

ADT JP 2004235051 A JP 2003-23197 20030131

PRAI JP 2003-23197 20030131

AB JP 2004235051 A UPAB: 20050907

NOVELTY - A solid **polymer electrolyte** is a mixture containing **polymer** having anionic group and **polymer** having amide group or alkoxy amide group in principal chain.

DETAILED DESCRIPTION - A solid **polymer electrolyte** is a mixture containing **polymer** (A) having anionic group and **polymer** (B) having amide (-CONH-) group or alkoxy amide group (-CONR-) in principal chain.

INDEPENDENT CLAIMS are also included for the following:

(1) solid-**polymer-electrolyte** film containing

solid **polymer electrolyte** packed in a porous base material; and

(2) fuel cell using the solid-**polymer-electrolyte** film.

USE - For fuel cell (claimed), **electrolysis** apparatus and **electrolyzer**. The fuel cell is used as electric power supply source for motor vehicles such as passenger car, bus, truck, ship, train, and household **appliances** such as mobile telephone, personal computer, and PDA.

ADVANTAGE - The solid **polymer electrolyte** has high ionic conductivity and output, which is maintained for long period of time. Highly efficient fuel cell is provided using the solid **polymer electrolyte**.

DESCRIPTION OF DRAWINGS - The figure shows the isometric view of solid-**polymer-electrolyte** film.

Porous portion (1)
Non-porous portion (2)

TECH

POLYMERS - Preferred Composition: The **polymer** (A) having anionic group, is the **polymer** having -SO₃H or -SO₃X (where, X is alkali metal). The **polymer** (B) having -CONH- group in the principal chain, is the **polymer** chosen from group of formula (1), and/or their **copolymers**. Preferably, the **polymer** (B) having -CONR- group (where, R is alkoxy) or -CONH- group in the principal chain, is a mixture of alkoxy **polyamide** and **polyamide**. The **polymer** (B) is a layered silicate-**polymer** composite, which contains **polymer** (B) in interlayer.

n = degree of polymerization.

ORGANIC CHEMISTRY - Preferred Fuel: The fuel cell uses aqueous solution of methanol as fuel.

ABEX EXAMPLE - 20.5 wt.% solution of Nafion was mixed with ethanol solution of **copolymer** of nylon 6/nylon 66, in weight ratio of 10/1. The obtained mixture was coated on a **polyester** film, and subsequently dried at 100degreesC for 20 minutes. Then, the **polyester** film was peeled, to obtain solid **polymer electrolyte** film of 150 μm thickness. The output and ionic conductivity of the obtained solid **polymer electrolyte** film was measured in MCO, and found to be 1.4 $\text{mmol/cm}^2/\text{minute}$ and 4.9 S/cm², respectively. The output of the solid **polymer electrolyte** film in film-electrode composite (MEA), was measured after 1 day, 3 days, 10 days and 30 days, and found to be 6.8 mW/cm², 7.7 mW/cm², 8.3 mW/cm² and 8.2 mW/cm², respectively.

L131 ANSWER 4 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP ON STN

AN 2004-432715 [41] WPIX

DNC C2004-162203 [41]

DNN N2004-342013 [41]

TI Flexible membrane for fuel cells, e.g. for cars or domestic systems, comprises a porous composite support filled with **polymer electrolyte**, a porous substrate of glass or **polymer** fibres, and a porous ceramic coating

DC A18; A23; A26; A85; L03; X16

IN HENNIGE V; HOERPEL G; HYING C

PA (CREA-N) CREAVIS GES TECHNOLOGIE & INNOVATION MBH

CYC 1

PIA DE 10254732 A1 20040603 (200441)* DE 20[0]

ADT DE 10254732 A1 DE 2002-10254732 20021123

PRAI DE 2002-10254732 20021123

AB DE 10254732 A1 UPAB: 20050530

NOVELTY - Fuel cell membrane which is impermeable to the reaction components comprises a flexible, permeable composite support in which the pores are 75% filled with a proton-conducting **polymer electrolyte**, a flexible porous two-dimensional substrate made of woven and/or non-woven glass or **polymer** fibres, and a porous ceramic coating.

DETAILED DESCRIPTION - Dimensionally-stable, proton-conducting, flexible membrane (FM) for fuel cells which is impermeable to the reaction components in fuel cell reactions, comprising a flexible, permeable

composite support, a flexible **substrate** with a large number of openings and a **coating** in this **substrate**. The **substrate** material consists of woven and/or non-woven glass or polymer fibres, the **coating** is a **porous** ceramic **coating** and the **pores** in the support are filled to at least 75% with a proton-conducting **polymer electrolyte**. INDEPENDENT CLAIMS are also included for

(a) a method (M1) for the production of FM by infiltrating **electrolyte(s)** or **polymer electrolyte(s)** or

precursors thereof into the **pores** of the support as above

(b) a flexible membrane-**electrode** unit (MEU) for fuel cells, with conductive anode and cathode layers on either side of FM

(c) a method (M2) for the production of MEU by making FM as above, preparing a material for the production of **electrode** layers (proton-conductive component, catalyst (or precursor) for the anode or cathode reaction, optionally a catalyst support and optionally a **pore-former**), **coating** this material onto each side of the membrane (FM) and producing a strong bond between the **coatings** and the membrane, with the formation of a **porous**, proton-conducting anode or cathode layer

(d) fuel cells containing FM or MEU

(e) mobile or stationary systems with an MEU, fuel cell or fuel cell stack containing FM or MEU as above.

USE - In fuel cells, direct-methanol fuel cells and reformat fuel cells, or for the production of membrane-**electrode** units, fuel cells or fuel cell stacks (claimed); also claimed is the use of membrane-**electrode** units containing these **electrolyte** membranes in the **applications** listed above. **Applications** include mobile and stationary fuel cells for cars and domestic energy systems.

ADVANTAGE - A dimensionally-stable, proton-conducting, flexible membrane which shows almost no change in volume after swelling or drying (in spite of the necessary swelling), combined with good conductivity and good long-term stability (especially because of the reduced risk of washing out the **electrolyte**). This system combines the advantages of **polymer electrolytes** (water-resistance, long-term stability, high conductivity) with those of flexible ceramic membranes (dimensional stability, high **porosity**, flexibility).

TECH

POLYMERS - Preferred Membrane: FM with a thickness of 10-150 microns, a bending radius of down to 5000 m (preferably down to 2 mm) and a conductivity (in the swollen state) of at least 5 (preferably at least 50) mS/cm, stable up to a temperature of at least 80degreesC. Preferred Units: Membrane-**electrode** units which can be operated at a temperature of at least 80 (preferably at least 120) degreesC and will tolerate a bending radius as above. Proton-conducting material of the same composition is used in the anode and cathode layers and the **electrolyte** membrane. Different catalysts are used in the anode and cathode layers, and the catalyst support in these layers is electrically conductive. Preferred Components: **Polymer electrolytes** (PE) comprise **Nafion** (RTM), sulfonated or phosphonated, fluorinated or unfluorinated polyolefins, polyethers, polystyrenes, polysulfones, polyphenylsulfones, polyimides, polyoxazoles, polytriazoles, polybenzimidazoles, polyether-ether-ketones or polyether-ketones. Preferred supports comprise woven fabric with a mesh width of 5-500 microns or non-woven with a thickness of 5-100 microns, consisting of fibres with a thickness of 0.5-150 microns, preferably aluminosilicate glass fibres with at least 60 wt% SiO2 and at least 10 wt% Al2O3. The **substrate** consists of non-woven fabric

based on polymer fibres, preferably **polyacrylonitrile**, **polyamide**, **PVDF**, **PTFE**, **polyolefin** and/or **polyimide** fibres. Preferred Methods: M1 involves infiltrating the pores of the support with molten PE and solidifying the melt, or infiltrating with a 2.5-50 vol% solution of PE and drying the solution at up to 250degreesC, or infiltrating with precursors of ion-conducting polymers and then **polymerising/crosslinking** these in the pores. Suitable solvents for PE solutions comprise alcohols, hydrocarbons, ethers, esters, ketones, aldehydes and/or water. Infiltration/drying may be repeated several times, and infiltration may be carried out (possibly as a continuous process) by printing, pressing on or in, roller-coating, spreading, **painting**, **dip-coating**, spraying or pouring onto the support. M2 involves (A) pressing the **electrode** layer materials onto the membrane and forming a strong bond by heating at 20-300 (preferably 80-150) degreesC, or (B) **coating** the **electrode** material onto a supporting membrane (preferably of PTFE), drying the **coating**, pressing the **coating** onto the membrane at 20-300 (preferably 80-150) degreesC and removing the supporting membrane (preferably by mechanical or chemical methods or by pyrolysis), or (C) using a method similar to (B) with carbon paper or electrically-conductive woven or non-woven fabric as the supporting membrane (which is not removed). The **electrode**-producing material contains a metal salt catalyst, preferably hexachloroplatinic acid, which is reduced on the membrane to form the required catalyst; an open-pore gas diffusion **electrode**, preferably open-pore carbon paper, is then pressed onto the catalyst or fixed on the catalyst with a conductive adhesive. **Electrode** material may be **applied** repeatedly, optionally with a drying step (preferably at up to 300degreesC) between each **application**, preferably in a continuous manner onto the membrane (FM) or a flexible supporting membrane taken from a roll of material.

INORGANIC CHEMISTRY - Preferred Porous Coating:

Particles of aluminum, silicon, zirconium and/or titanium oxide(s).

ELECTRICAL POWER AND ENERGY - Preferred Applications: Systems containing these units and fuel cells comprise vehicles (mobile units) and domestic energy systems (stationary).

ABEX **EXAMPLE -** A mixture of 130 g water and 30 g ethanol was treated with 30 g 5 wt% aqueous nitric acid, 10 g tetraethoxysilane, 2.5 g methyltriethoxysilane and 7.5 g Dynasilan AMEO (RTM: 3-aminopropyltriethoxysilane), then the sol obtained was stirred for a few hours, treated with 145 g MZS1 (RTM) and 145 g MZS3 (RTM), homogenised for at least 48 hours in a closed vessel and filtered to form a fine slurry. Commercial **polyacrylonitrile** non-woven (thickness 15 microns) was **coated** with the slurry by a continuous roller process at 280degreesC with a belt speed of 24 m/h, to give a composite support (S450FAN) with an average pore size of 450 nm and a thickness of 30 microns. This support was infiltrated with a 7.5 wt% commercial solution of **Nafion** (RTM) and dried for 15 minutes at 100degreesC to render the **Nafion** (RTM) insoluble in water; this process was repeated 6 times to give a moist gas-tight membrane with a BP of more than 6 bar, a Gurley number of more than 1500, a longitudinal expansion of less than 1% in all directions after swelling in water at room temperature and a conductivity of 35 mS/cm (swollen membrane; thickness = 40 microns). A membrane-**electrode** unit for a fuel cell was made by screen-printing the membrane on both sides with ink containing carbon black, catalyst, **Nafion** (RTM) and an alcohol mixture, and then drying each **coating** at 120degreesC to form anode and cathode layers. Fuel cells containing these units were very reliable in operation, showing very good long-term stability and little adverse effect on

performance after drying out and re-wetting.

L131 ANSWER 5 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 2004-248288 [23] WPIX
 CR 2004-246919
 DNC C2004-097051 [23]
 DNN N2004-196984 [23]
 TI Plating a **nanoporous** metal membrane for membrane
electrode assembly, has freely supporting portion of
nanoporous metal membrane on metal plating solution having plating
 metal(s), and contacting metal plating solution with reducing agent
 DC A85; A88; L03; M11; M13; P42; P53; P73; X16; X25
 IN DING Y; ERLEBACHER J
 PA (DING-I) DING Y; (ERLE-I) ERLEBACHER J; (UYJO-C) UNIV JOHNS HOPKINS
 CYC 103
 PIA WO 2004021481 A1 20040311 (200423)* EN 35[8]
 AU 2003261462 A1 20040319 (200462) EN
 US 20050112432 A1 20050526 (200535) EN
 ADT WO 2004021481 A1 WO 2003-US24808 20030827; US 20050112432 A1 Provisional
 US 2002-406065P 20020827; US 20050112432 A1 US 2003-647436
 20030826; AU 2003261462 A1 AU 2003-261462 20030827
 FDT AU 2003261462 A1 Based on WO 2004021481 A
 PRAI US 2003-647436 20030826
 US 2002-406065P 20020827
 AB WO 2004021481 A1 UPAB: 20060121
 NOVELTY - Plating a **nanoporous** metal membrane (10) comprises
 freely supporting a portion of **nanoporous** metal membrane on a
 metal plating solution (14) comprising at least one plating metal; and
 contacting the metal plating solution with a reducing agent, thus plating
 a portion of the **nanoporous** metal membrane with the at least one
 plating metal.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:
 (a) a plated article comprising a **nanoporous** metal
 membrane; and a plating layer comprising at least one metal constituent
 formed on at least a portion of the **nanoporous** metal membrane;
 (b) a membrane **electrode** assembly comprising a
polymer electrolyte membrane; and a **nanoporous**
 metal membrane adhered to at least one **surface** of the
polymer electrolyte membrane, where the
nanoporous metal membrane comprises a plating layer comprising at
 least one metal; and
 (c) a fuel cell comprising a membrane **electrode** assembly.
 USE - For plating a **nanoporous** metal membrane for
 membrane **electrode** assembly used for fuel cell (claimed).
 ADVANTAGE - The method consumes a minimum amount of plating
 material. It does not subject the fragile object to be plated to
 mechanical shocks and loads.
 DESCRIPTION OF DRAWINGS - The figure shows a rigid
 substrate with an adhered **nanoporous** metal membrane
 being inserted into a metal plating solution.
 Nanoporous metal membrane (10)
 Substrate (12)
 Metal plating solution (14)
 Container (16)
 TECH METALLURGY - Preferred Parameter: The plating layer has a thickness of 1-5
 nm. The plating layer has a loading density of less than 0.1 (preferably
 0.005) mg/cm². The **nanoporous** metal membrane has a thickness of
 less than 500 (preferably less than 100) nm. Preferred Component: The
nanoporous metal membrane comprises gold. The plating layer

comprises at least one precious metal from platinum, iridium, rhodium, ruthenium, palladium, cobalt and/or silver. Preferred Method: The method further comprises contacting a portion of the **nanoporous** metal membrane with at least one thiol prior to freely supporting at least a portion of the **nanoporous** metal membrane on a metal plating solution. The **surface** of the **nanoporous** metal membrane is plated with the at least one plating metal continuously.

POLYMERS - Preferred Component: The **polymer electrolyte** membrane comprises **perfluorinated sulfonic acids** or **polystyrene sulfonate**.

ORGANIC CHEMISTRY - Preferred Material: The thiol is $\text{CH}_3(\text{CH}_2)_{11}\text{-SH}$ and/or $\text{CH}_3(\text{CH}_2)_{18}\text{-SH}$.

INORGANIC CHEMISTRY - Preferred Composition: The metal plating solution comprises 2-20 g/L $\text{Na}_2\text{Pt}(\text{OH})_6$.

ABEX SPECIFIC COMPOUNDS - The reducing agent is hydrazine.

L131 ANSWER 6 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP ON STN

AN 2004-202496 [19] WPIX

CR 2006-135636

DNC C2005-214374 [73]

DNN N2005-577360 [73]

TI Metal-coated **polymer electrolyte** membrane for fuel cell assembly comprises wave-like **surface** microstructure having crests and troughs, reinforcement wires, and metal film **deposited** on top of **surface** microstructure

DC A85; L03; X16

IN JEON Y; PAN A I

PA (HEWP-C) HEWLETT-PACKARD DEV CO LP; (JEON-I) JEON Y; (PANA-I) PAN A I

CYC 104

P1A US 20040028973 A1 20040212 (200419)* EN 11[5]

WO 2004015804 A2 20040219 (200419) EN

AU 2003258122 A1 20040225 (200456) EN

EP 1527495 A2 20050504 (200530) EN

JP 2005535098 W 20051117 (200576) JA 13

US 6977009 B2 20051220 (200601) EN

AU 2003258122 A8 20051110 (200634) EN

ADT US 20040028973 A1 US 2002-212720 20020807; AU 2003258122 A1 AU 2003-258122 20030807; EP 1527495 A2 EP 2003-784962 20030807; WO 2004015804 A2 WO 2003-US24649 20030807; EP 1527495 A2 WO 2003-US24649 20030807; JP 2005535098 W WO 2003-US24649 20030807; JP 2005535098 W JP 2004-527800 20030807; AU 2003258122 A8 AU 2003-258122 20030807

FDT AU 2003258122 A1 Based on WO 2004015804 A; EP 1527495 A2 Based on WO 2004015804 A; JP 2005535098 W Based on WO 2004015804 A; AU 2003258122 A8 Based on WO 2004015804 A

PRAI US 2002-212720 20020807

AB US 20040028973 A1 UPAB: 20060203

NOVELTY - A metal-coated **polymer electrolyte** membrane (101) (PEM) comprises wave-like **surface** microstructure (300) with crests (303) and troughs (305), reinforcement wires (301) embedded in membrane, and metal film (307) **deposited** on top of **surface** microstructure. The reinforcement wires have young's modulus that is greater than young's modulus of membrane.

DETAILED DESCRIPTION - A metal-coated **polymer electrolyte** membrane (PEM) comprises wave-like **surface** microstructure with crests and troughs, reinforcement wires embedded in membrane, and metal film **deposited** on top of **surface** microstructure. The reinforcement wires have young's modulus that is greater than young's modulus of membrane. They are positioned parallel to the troughs of wave-like **surface** structure. The metal film is permeable only to protons and hydrogen. An INDEPENDENT CLAIM is also

included for a fuel cell assembly comprising anode, cathode, metal-coated PEM connecting the anode and the cathode, and fuel.
 USE - For fuel cell assembly (claimed).
 ADVANTAGE - The invention controls membrane expansion and prevents cracking in the metal coating.
 DESCRIPTION OF DRAWINGS - The figure depicts a polymer electrolyte membrane reinforced with wires.
 Metal-coated polymer electrolyte membrane (101)
 Wave-like surface microstructure (300)
 Reinforcement wires (301)
 Crests (303)
 Troughs (305)
 Metal film (307)

TECH

POLYMERS - Preferred Component: The PEM is sulfonated derivative of polymer from polysulfone, polyimide, polyphenylene oxide, polyphenylene sulfoxide, polyphenylene sulfide, polyparaphenylene, polyphenylquinoxaline, polyarylketone, polyetherketone, polyetheretherketone (PEEK), polyetherketone-ketone, polyetheretherketone-ketone, polyetherketoneetherketone-ketone, polybenzazole, polybenzimidazole (PBI), or polyaramid polymers. It is a composite membrane having multiple layers of PEMs. The multiple layers of PEMs include blended polymer membranes, and/or unblended polymer membranes. The composite membrane is Nafion or PBI membrane coated with sulfonated PEEK. The membrane has first and second sides. The fuel cell assembly further includes PEM-electrode structure having PEM and porous electrodes. Preferred Property: The reinforcement wires have a young's modulus that is at least 100-times greater than young's modulus of membrane.
INORGANIC CHEMISTRY - Preferred Component: The metal film comprises metal or alloy from palladium, neodymium, vanadium, iron, tantalum, or their alloys. The metal film comprises first metal layer covered with second metal layer. The first metal layer comprises material from neodymium, vanadium, iron, tantalum, or their alloys. The second metal layer comprises material from palladium, platinum, or their alloys. The metal film is further coated with a catalyst from platinum, platinum alloy, platinum black, or palladium black.

L131 ANSWER 7 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP ON STN
 AN 2004-178828 [17] WPIX
 DNC C2004-070810 [17]
 DNN N2004-142152 [17]
 TI Production of metal-coated polymer electrolyte membrane for fuel cell, involves depositing metal film permeable to protons and hydrogen, on micro textured surface of polymer electrolyte membrane
 DC A85; G02; L03; X16
 IN JEON Y; PAN A I
 FA (HEWP-C) HEWLETT-PACKARD DEV CO LP; (JEON-I) JEON Y; (PANA-I) PAN A I
 CYC 103
 PIA US 20030235737 A1 20031225 (200417)* EN 20[11]
 WO 2004001876 A2 20031231 (200417) EN
 AU 2003243706 A1 20040106 (200447) EN
 EP 1525639 A2 20050427 (200529) EN
 JP 2005530330 W 20051006 (200566) JA 18
 AU 2003243706 A8 20051110 (200634) EN

ADT US 20030235737 A1 US 2002-173825 20020619; AU 2003243706 A1
 AU 2003-243706 20030619; EP 1525639 A2 EP 2003-761214
 20030619; WO 2004001876 A2 WO 2003-US19608 20030619; EP
 1525639 A2 WO 2003-US19608 20030619; JP 2005530330 W WO
 2003-US19608 20030619; JP 2005530330 W JP 2004-516065
 20030619; AU 2003243706 A8 AU 2003-243706 20030619
 FDT AU 2003243706 A1 Based on WO 2004001876 A; EP 1525639 A2 Based on
 WO 2004001876 A; JP 2005530330 W Based on WO 2004001876 A; AU
 2003243706 A8 Based on WO 2004001876 A
 PRAI US 2002-173825 20020619
 AB US 20030235737 A1 UPAB: 20060121

NOVELTY - A mold having micro textured **surface** is fabricated.
 Microstructure is produced on the **surface** of a **polymer**
electrolyte membrane (PEM) (10) using the micro textured mold. A
 metal film (103) is **deposited** on the micro textured
surface (107) of PEM, to obtain a metal-coated PEM. The
 metal film is permeable to protons and hydrogen.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the
 following:

(1) metal-coated polymer electrolyte
 membrane;

(2) electrolyte membrane; and

(3) fuel cell assembly.

USE - For producing metal-coated PEM used for
electrochemical devices such as fuel cell (claimed).

ADVANTAGE - The production method provides **polymer**
electrolyte membrane (PEM) having excellent electrical resistance
 and ion conductivity. PEM is chemically stable to acids and free radicals,
 thermally or hydrolytically stable, and has low permeability to fuel, gas
 or impurities. The thin metal film relieves **surface** tension,
 expansion induced cracking of metal film and expansion-reduced stress. The
porous metal layer increases reaction **surface** area,
 reaction rate and provides mechanical interlocking between the metal film
 and PEM. Fuel, gas and impurity crossover in fuel cell
applications, are prevented.

DESCRIPTION OF DRAWINGS - The figure shows the changes of
 continuity of a thin metal film under **polymer**
electrolyte membrane expansion.

polymer electrolyte membrane (101)
 metal film (103)
 micro textured **surface** (107)
 protrusions (108)

TECH

POLYMERS - Preferred Component: The **polymer**
electrolyte membrane is a sulfonated derivative of a
polymer such as polysulfone, polyimide,
 polyphenylene oxide, polyphenylene sulfoxide,
 polyphenylene sulfide, polyparaphenylene,
 polyphenyl quinoxaline, polyaryl ketone,
 polyether ketone, polyether ether ketone (PEEK),
 polyether ketone-ketone, polyether ether ketone-ketone
 (PEEKK), polyether ketone ether ketone-ketone (PEEKKK),
 polybenzazole (PBZ), polybenzimidazole (PBI) or
 polyaramid polymer. PEM is a blended **polymer**
 or a composite membrane, which is Nafion coated with
 sulfonated PEEK, and a PBI membrane coated with
 sulfonated PEEK.

METALLURGY - Preferred Metal Film: The metal film comprises a metal or an
 alloy selected from palladium, platinum, niobium, vanadium, iron,
 tantalum, and their alloys, preferably palladium, niobium, vanadium, iron,

tantalum, and their alloys.

L131 ANSWER 8 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 2004-141738 [14] WPIX
 DNC C2004-056652 [14]
 DNN N2004-113069 [14]
 TI Hydrophobic fibrous carbon gas diffusion backing for manufacture of
 membrane **electrode** or fuel cell, has **porous**,
 conductive sheet material treated with partially **fluorinated**
polymer from (meth)acrylic- and/or urethane **polymers**
 DC A14; A28; A85; L03; X16
 IN BUXTON; BUXTON L W; FITZGERALD P H; REICHERT D L
 PA (BUXT-I) BUXTON L W; (DUPO-C) DU PONT DE NEMOURS & CO E I; (FITZ-I)
 FITZGERALD P H; (REIC-I) REICHERT D L
 CYC 33
 PIA US 20030219645 A1 20031127 (200414)* EN 10[2]
 EP 1378952 A1 20040107 (200414) EN
 JP 2003323898 A 20031114 (200414) JA 12
 ADT US 20030219645 A1 Provisional US 2002-374926P 20020422; US
 20030219645 A1 US 2003-413184 20030414; EP 1378952 A1 EP
 2003-252448 20030417; JP 2003323898 A JP 2003-115633 20030421
 FRAI US 2003-413184 20030414
 US 2002-374926P 20020422
 AB US 20030219645 A1 UPAB: 20050528
 NOVELTY - A hydrophobic fibrous carbon gas diffusion backing (GDB)
 comprises a **porous**, conductive sheet material treated with a
 partially **fluorinated polymer** from (meth)acrylic
polymers and/or urethane **polymers**.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:
 (a) a method for forming a hydrophobic fibrous carbon GDB; and
 (b) a method for making a membrane **electrode** assembly
 (MEA) (30) comprising providing a **fluorinated solid**
polymer electrolyte membrane having two sides, forming
 two catalyst layers on the two sides of the **fluorinated solid**
polymer electrolyte membrane to form a catalyst
coated membrane, and providing two hydrophobic fibrous carbon gas
 diffusion backings adjacent the two catalyst layers of the catalyst
coated membrane.
 USE - For making of MEA or fuel cell (claimed).
 ADVANTAGE - The method provides a simplified, economical process
 for producing GDBs and MEAs that does not require a long, complicated
 sintering of the **fluoropolymers** at undesirably high temperatures
 not employ expensive amorphous **fluoropolymer** solutions.
 DESCRIPTION OF DRAWINGS - The figure is a schematic illustration of
 the single cell test assembly employed in evaluating the performance of
 the GDB.
 GDB (13)
 MEA (30)
 TECH **POLYMERS** - Preferred Component: The **porous** conductive
 sheet material is paper or cloth made from woven or non-woven carbon
 fiber. A microporous layer **coating** of carbon particles
 and a hydrophobic binder are included. The binder is unhydrolyzed
perfluoro ionomer resin or **polyvinylidene**
difluoride. The partially **fluorinated polymer**
 comprises **fluorinated alkyl** side chains with a length of 4-20C.
 It comprises at least 60% of a **fluorinated acrylate**, methacrylate
 or urethane monomer. It is **applied** by dipping, spraying or
 padding. The **fluorinated alkyl** side chains are of structure
 CF3-(CF2)n-X-. A **fluorinated solid polymer**

electrolyte membrane and catalyst layer(s) in ionic conductive contact with the membrane are included. The **fluorinated solid polymer electrolyte** membrane is a per **fluorinated sulfonic acid polymer** membrane. It is also a reinforced per **fluorinated ion exchange membrane** from expanded-**polytetrafluoroethylene** with an ion exchange **polymer**. The ion exchange **polymer** is a per **fluorinated sulfonic acid polymer**. The two catalyst layers comprise a noble metal catalyst and an ionomeric resin binder.

n = 3-17;

X = bridging group, preferably -(CH₂)_p-, or -SO₂-NR-;

p = 1-6;

R = CH₃-, or CH₃-CH₂.

ABEX EXAMPLE - Carbon cloth, Zoltek, was treated with a **fluorinated polymeric surface** treating agent in a pad-bath **applicator**, which passes the fabric through an aqueous bath, and through squeeze rolls to give uniform treatment. Isopropanol (10 wt.%) was used to improve wetting. 77% Wet pick-up was obtained. Thus, with 3.3 wt.% of a bath of Zonyl 7040, 2000 ppm **fluorine** on the fabric was obtained. After treatment, the fabrics were dried (and cured) for 2 minutes at 300degreesF in a forced air oven for forming a GDB (13). The GDB repelled water and isopropanol. The conductivity was measured to be 71.9+/-2.3 S/cm.

L131 ANSWER 9 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2004-108663 [11] WPIX

DNC C2004-044470 [11]

DNN N2004-086328 [11]

Tf Laminated membrane for use for fuel cells consists of a membrane made of an aromatic **polymer electrolyte** having super-strong acid groups and a membrane made of **perfluoroalkylsulfonic acid polymer electrolytes**

DC A26; A85; L03; P73; X16

IN IWASAKI K; SHINODA H; YOSHIMURA K

PA (SUMO-C) SUMITOMO CHEM CO LTD

CYC 103

PIA WO 2004004037 A1 20040108 (200411)* JA 55[0]

JP 2004025793 A 20040129 (200411) JA 18

JP 2004063301 A 20040226 (200416) JA 14

AU 2003242451 A1 20040119 (200447) EN

JP 2004303541 A 20041028 (200471) JA 9

EP 1519435 A1 20050330 (200522) EN

KR 2005013162 A 20050202 (200540) KO

TW 2004000877 A 20040116 (200567) ZH

CN 1666369 A 20050907 (200607) ZH

US 20060166047 A1 20060727 (200650) EN

ADT WO 2004004037 A1 WO 2003-JP7704 20030618; JP 2004025793 A

JP 2002-189447 20020628; JP 2004063301 A JP 2002-220867

20020730; JP 2004303541 A JP 2003-94089 20030331; AU

2003242451 A1 AU 2003-242451 20030618; CN 1666369 A CN

2003-815282 20030618; EP 1519435 A1 EP 2003-733475 20030618

; EP 1519435 A1 WO 2003-JP7704 20030618; TW 2004000877 A TW

2003-116864 20030620; KR 2005013162 A KR 2004-721298 20041227; US

20060166047 A1 WO 2003-JP7704 20030618; US 20060166047 A1 US

2004-519198 20041223

FDT AU 2003242451 A1 Based on WO 2004004037 A; EP 1519435 A1 Based on WO 2004004037 A

PRAI JP 2003-94089 20030331

JP 2002-189447 20020628

JP 2002-220867 20020730

AB WO 2004004037 A1 UPAB: 20060804

NOVELTY - A laminated membrane consisting of a membrane (I) made of an aromatic **polymer electrolyte** having super-strong acid groups and a membrane (II) made of a combination of one substance selected from **perfluoroalkylsulfonic acid polymer electrolytes** and a non-super-strong acid **polymer electrolyte**, is new.

USE - The laminated membrane is for use for **electrolyte** membranes for use in fuel cells.

ADVANTAGE - The laminated membrane has an excellent power generation performance and excellent mechanical strength.

TECH

ELECTRICAL POWER AND ENERGY - Preferred Membrane : In the membrane (I) the aromatic **polymer electrolyte** having super-strong acid groups is represented by general formula (1):

A = divalent aromatic group ;

A' = divalent aromatic group substituted with super-strong acid groups ;

Z, Z' = direct bond or divalent group ;

m = 10 - 100000 ; and

n = 0 - 100000.

In (1), A is a divalent aromatic group selected from groups represented by general formulae (3a) - (3c), and A' is a divalent aromatic group selected from groups represented by general formulae (3d) - (3g).

R = OH, 1-6C alkyl, 1-6C alkoxy, 7-12C aralkyl, aryl group or halogen atom ;

p, r, s, t = 0 - 4 ;

q = 0 - 6 ;

j = 0 or 1 ;

Y = direct bond or divalent group ;

Z, Y = direct bond or divalent group : approximately D = super-strong acid group ;

h, h' = 1 - 4 ;

s', t', r, t = 0 - 4 ;

(q' + h') = 1 - 6 ;

j = 0 or 1

In (1), Z, Z' and Y are independently -O-, -S-, -CO-, -SO2-, 1-20C alkylene or 1-20C alkylenedioxy groups, and Z is -O-, -S-, -CO-, -SO2-, a 1-20C alkylene group, a 1-20C alkylenedioxy group, a 6-12C arylene group, a 6-12C arylloxy group or a 6-20C alkyleneoxy group in which all the hydrocarbon groups can be substituted with F atoms. The super-strong acid group is one group selected from groups represented by general formulae

(2a) - (2d):

-G-SO3-W+ (2a)

-G-SO2N-W+SO2-E (2b)

-G-P(O)(O-W+)2 (2c)

-G-P(O)O-W+-E (2d)

G = alkylene, aralkylene or arylene group, which can be partially or wholly substituted with F atoms ;

W+ = positive ion ;

E = alkyl, aralkyl or aryl group, which can be partially or wholly substituted with F atoms

In (2a) - (2d), W is preferably H. A typical aromatic **polymer electrolyte** having super-strong acid groups is represented by general formula (4).

Ar1, Ar2 = divalent aromatic groups ;

a = 0, 1, 2 or 3 ;

X+ = H+, alkali ion or ammonium ion

A laminated membrane contains the membrane (II) as at least one outermost **surface** membrane, where the wt % of membrane (II) is 0.1 - 50 wt %.

Another laminated membrane consists of a membrane comprising a **perfluoroalkylsulfonic acid polymer electrolyte** (III) and a membrane comprising a non-super-strong acid **polymer electrolyte** (IV). Preferred Process : A process for producing the laminated membrane comprises **coating** a solution containing an aromatic **polymer electrolyte** having super-strong acid groups on the membrane (II) and drying. Preferred Fuel Cell : In the fuel cell, a mixture of catalysts carried on carbon and **perfluoroalkylsulfonic acid resins** is fixed on an **electrode material**.

ABEX WIDER DISCLOSURE - A fuel cell contains the invented laminated membrane.

EXAMPLE - An aromatic **polymer** having super-strong acid groups (c) was obtained by reacting **poly(oxy-4,4'-biphenyloxy-4,4'-diphenylsulfone)**, CH₂Cl₂ and bromosquicineimide while adding dropwise conc H₂SO₄, reacting the resulting **polymer** with 5-I-octafluoropentyl-3-oxapentasilfluoride and reacting the resulting **polymer K-salts** with Cu powder. A composite membrane (e) was obtained by **coating** a **sulfonated aromatic polymer** having super-strong acid groups on a **polyethylene porous film**. A CH₂Cl₂/CH₃OH solution containing the aromatic **polymer** (c) was **coated** on both **surfaces** of (e) placed on a glass plate, and dried at 60 degreesC for 10 minutes so as to obtain a laminate membrane (f). A fuel cell containing this membrane (f) generated a voltage of 0.58 V at an electric current of 0.50 (A/cm²).

L131 ANSWER 10 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2003-457340 [43] WPIX

DNC C2003-121719 [43]

DNN N2003-363715 [43]

TI **Polymer electrolyte** solution for **electrode** assemblies in fuel cells, has **perfluorocarbon sulfonic acid resin** dissolved in solvent containing polar solvent which is hydrophilic and has boiling point

DC A85; L03; X16

IN FUJII Y; OHYA S; OYA N; TAKAGI; TAKAGI J

PA (FUJI-I) FUJII Y; (OHYA-I) OHYA S; (TAKA-I) TAKAGI J; (UBEI-C) UBE IND LTD

CYC 27

FIA WO 2003036655 A1 20030501 (200343)* JA 35[7]

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JP 2004164854 A 20040610 (200438) JA 16

EP 1447816 A1 20040818 (200454) EN

US 20040265676 A1 20041230 (200503) EN

ADT WO 2003036655 A1 WO 2002-JP11004 20021023; US 20040265676 A1

WO 2002-JP11004 20021022; EP 1447816 A1 EP 2002-802058

20021023; JP 2004164854 A JP 2002-307821 20021023; EP

1447816 A1 WO 2002-JP11004 20021023; US 20040265676 A1 US

2004-493204 20040421

FDT EP 1447816 A1 Based on WO 2003036655 A

PRAI JP 2002-278321 20020925

JP 2001-328131 20011025

JP 2002-53552 20020228

AB WO 2003036655 A1 UPAB: 20050903

NOVELTY - **Polymer electrolyte** solution has a **perfluorocarbon sulfonic acid resin** dissolved in a solvent containing a polar solvent which is hydrophilic and has a boiling point.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a **polymer electrolyte** film produced using the solution;

(2) a gas diffusion **electrode** for a **polymer electrolyte** solution fuel cell where a structure in which metal particles are dispersed on a **porous carbon substrate** is coated with a **polymer electrolyte** film formed from the **electrolyte** solution;

(3) a **polymer electrolyte** film-gas diffusion **electrode** assembly; and

(4) a fuel cell using the assembly.

USE - The solution is used in the production of **electrolyte** films for gas diffusion **electrodes** for fuel cells.

ADVANTAGE - The **polymer electrolyte** film has a high solvent resistance and a high strength. The fuel cell has a high electrical production efficiency per unit **surface** area.

TECH

ORGANIC CHEMISTRY - Preferred Materials: The solvent is a mixed solvent containing the polar solvent and water in an amount of 2-50 wt.%. The polar solvent is an aprotic solvent such as N,N-dimethyl-formamide, or an ether solvent. The weight ratio of polar solvent to water is 40/1-1/2.

POLYMERS - Preferred Composition: The concentration of **perfluorocarbon sulfonic acid** resin is 0.5-30 wt.%.
ABEX

EXAMPLE - A **perfluorocarbon sulfonic acid** resin solution is precipitated in solid form by vaporizing the solvent, drying the **polymer** for 24 hours at low pressure and collecting the dark red **Nafion** (RTM) powder formed. This powder is dissolved in N,N-dimethyl-formamide to give a **polymer electrolyte** solution of concentration of 5-20 wt.%.

L131 ANSWER 11 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2003-031681 [03] WPIX

DNC C2003-015469 [06]

DNN N2003-046451 [06]

II Solid **polymer electrolyte** material used in solid **polymer** fuel cell, is made of **copolymer** comprising repeating unit based on **fluoromonomers**

DC A14; A85; L03; S03; X12; X16; X21; X25

IN ERIGUCHI T; KOKUKYO Y; KUNISA Y; TANUMA T; WATAKABE A

PA (ASAG-C) ASAHI GLASS CO LTD

CYC 29

PIA EP 1220344 A2 20020703 (200303)* EN 29[0]

<--

CA 2366172 A1 20020626 (200303) EN

<--

JP 2002260705 A 20020913 (200303) JA 19

<--

US 20020142207 A1 20021003 (200303) EN

<--

US 7220508 B2 20070522 (200734) EN

ADT EP 1220344 A2 EP 2001-130538 20011221; CA 2366172 A1 CA

2001-2366172 20011224; JP 2002260705 A JP 2001-394775

20011226; US 20020142207 A1 US 2001-25763 20011226; US

7220508 B2 US 2001-25763 20011226

PRAI JP 2000-395511 20001226

AB EP 1220344 A2 UPAB: 20050706

NOVELTY - A solid **polymer electrolyte** material is made of a **copolymer** comprising repeating units based on **fluoromonomer A** and **fluoromonomer B** of specified formula. The **fluoromonomer A** on radical **polymerization** gives a **polymer** having an alicyclic structure in the main chain.

DETAILED DESCRIPTION - A solid **polymer electrolyte** material is made of a **copolymer** comprising repeating units based on **fluoromonomer A** which gives a **polymer** having an alicyclic structure in the main chain by radical **polymerization**, and **fluoromonomer B** of formula (B).

CF2=CF(Rf)SO3M (B)

j = 0 or 1;
 X = fluorine, chlorine or OM;
 M = H, alkali metal or NR1R2R3R4;
 R1-R4 = H or monovalent organic group;
 Rf = 1-20C optionally branched polyfluoroalkylene,
 which may contain ether oxygen atoms.

INDEPENDENT CLAIMS are also included for the following:

(i) A liquid composition comprising an organic solvent having a hydroxyl group, and the solid **polymer electrolyte** material;

(ii) A solid **polymer** fuel cell comprising an anode, cathode and a **polymer electrolyte** membrane disposed between anode and cathode. The cathode contains the solid **polymer electrolyte** material;

(iii) A **fluoropolymer** comprising a **copolymer** containing repeat unit of formula (I) and a repeat unit based on a **fluoromonomer** D of formula (II). The content of the repeat unit based on the **fluoromonomer** D is 10-75 mol.%, and the number average molecular weight is 5,000-5,000,000; and

(iv) A solid **polymer electrolyte** membrane made of a **polymer electrolyte** comprising a **copolymer** consisting of a repeat unit of formula (I), a repeat unit based on a **fluoromonomer** D of formula (II) and a repeat unit based on **tetrafluoroethylene**. The content of repeat unit of formula (I) and the content of repeat unit based on **tetrafluoroethylene** is 20-60 mol.%, respectively. The content of repeating unit based on **fluoromonomer** D is 10-40 mol.%.

CF2=CFO(CF2CFYO)k'(CF2)2SO3M (II)

Rf16, Rf17, Y = fluorine or trifluoromethyl;

and

kl = 0 or 1.

USE - As **polymer electrolyte** for lithium ion cell, as cation exchange resin, as sensor employing modified **electrode**, as ion exchange filter for removing trace amounts of ions in air or an actuator. The membrane formed using the **electrolyte** is used as cation permselective membrane for **electrolysis** of sodium chloride and water, production of hydrogen peroxide and ozone, for recovering waste acid, as cation exchange membrane for **electrolysis** in desalination or salt production, for diffusion dialysis in separation and purification of an acid, base and salt, as charged **porous** membrane for separation of protein and as dehumidifying and humidifying membranes. The solid **polymer** fuel cell is used as power source for vehicles such as electric car or for a small size cogeneration system.

ADVANTAGE - The solid **polymer** fuel cell has high power generation efficiency and high output density when the operation temperature is low. The utilization ratios of anode reaction gas and cathode reaction gas are high. The **fluoropolymer** has excellent ionic conductivity, water repellency and gas permeability hence the solid **polymer** material made using the **fluoropolymer** is excellent. A constant high electric output is obtained since the solid **polymer** fuel cell contains the **polymer electrolyte** material as a constituting material. Thus the solid **polymer** cell operable even at very high temperature. The solid **polymer electrolyte** material is durable, has improved cell life and does not shrink.

TECH

POLYMERS - Preferred Monomer: The **fluoromonomer** A is a perfluoromonomer and **fluoromonomer** B is same as **fluoromonomer** D.

Preferred Properties: The solid **polymer electrolyte** material has an ion exchange capacity of 0.5-2.5 meq/g dry resin. The -SO₃H group at the terminal of the repeating unit based on the **fluoromonomer B**, is a -SO₃H group, which is useful as a material constituting a solid **polymer fuel cell**. The **copolymer** of solid **polymer electrolyte** material has a softening temperature of 100degreesC.

ABEX DEFINITIONS - Preferred Definitions: - M = H.

SPECIFIC COMPOUNDS - The **fluoromonomer A** is selected from **perfluoro**(3-butenyl vinyl ether), **perfluoro**(2,2-dimethyl-1,3-dioxole), **perfluoro**(1,3-dioxole), 2,2,4-trifluoro-5-trifluoromethoxy-1,3-dioxole and **perfluoro**(2-methylene-4-methyl-1,3-dioxolane), preferably **perfluoro**(2,2-dimethyl-1,3-dioxole).

EXAMPLE - A nitrogen purged autoclave was charged with **perfluoro**(2,2-dimethyl-1,3-dioxazole) (PDD) (in g) (26.0), CF₂=CFOCF₂CF(CF₃)OCF₂CF₂SO₃H (127.8) (PSVE-H) and (CH₃)₂CHOC(=O)OOC(=O)OCH(CH₃)₂ (IPP) and **polymerized**. The obtained **polymer** was diluted, poured into hexane and precipitated. The **polymer** had average molecular weight of 56000. The obtained **polymer** was hydrolyzed, dissolved in ethanol and a transparent ethanol solution containing 10 mass% of the **polymer** PDD/PSVE-H was obtained. A platinum supported carbon (PSC) was dispersed in the obtained ethanol solution, dried and pulverized. The obtained powder was re-dispersed in 2,2,3,3,3-pentafluoro-1-propanol and a **coating liquid** for forming catalyst layer of cathode was obtained. PSC was mixed and dispersed in ethanol solution of **tetrafluoroethylene** (TFE)/PSVE-H **copolymer** obtained using TFE and PSVE-H, and a **coating liquid** was obtained for forming catalyst layer on anode. A water repellent carbon powder layer was loaded on water repellent carbon cloth, hot pressed and a catalyst layer was formed. The **coating liquids** for forming catalyst layers of cathode and anode were **coated** on water repellent carbon powder layer and dried to form respective **electrode** catalyst layers. The cathode and anode were cut and interposed with a **polymer electrolyte** membrane made of **sulfonic acid type perfluorocarbon polymer FLEMION HR**, bonded and a membrane **electrode** assembly was obtained. A separator made of carbon and having a gas flow path was mounted to obtain a cell for measurement. A current voltage characteristics test of the cell was carried out. Cell voltages upon expiration of 10 hours from the initiation of the operation at 0.3 A.cm⁻² and 1 A.cm⁻² were 820/mV and 725/mV respectively.

L131 ANSWER 12 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 2002-292013 [33] WPIX
 DNC C2002-085768 [33]
 DNN N2002-227994 [33]
 TI Multicomponent composite film for **polymer electrolyte** consists of support layer film and **porous gellable polymer** layer which are united with each other without interface between them
 DC A85; L03; P42; P73; X16
 IN AHN B; AHN B I; AHN B I L C; AHN S; AHN S H; AN B; CHO C; CHO J; CHO J Y; GYONG Y; KYUNG Y; KYUNG Y J; LEE H; LEE H G; LEE H K; LEE H M; LEE H M L C; LEE S; LEE S J; LEE S J L C; LEE S Y; LEE S Y L C; PARK C; PARK S; PARK S Y; PARK S Y L C; RYONG H; SONG H; SONG H S; SONG H S L C; YONG H; YONG H B; BYEONG I A; HEON S S; HYANG-MOK L; HYEON H Y; HYEONG G L; YU J K
 FA (AHNB-I) AHN B; (AHNS-I) AHN S; (CHOJ-I) CHO J; (KYUN-I) KYUNG Y; (LEEH-I) LEE H; (LEES-I) LEE S; (GLDS-C) LG CHEM CO LTD; (GLDS-C) LG CHEM LTD;

(PARK-I) PARK S; (SONG-1) SONG H; (YONG-I) YONG H

CYC 24

PIA WO 2002015299 A1 20020221 (200233)* EN 34[2] <--

KR 2002013634 A 20020221 (200257) KO <--

US 20020187401 A1 20021212 (200301) EN <--

KR 2002071203 A 20020912 (200311) KO <--

CN 1388993 A 20030101 (200328) ZH <--

EP 1310005 A1 20030514 (200333) EN <--

KR 373204 B 20030225 (200345) KO <--

JP 2004506542 W 20040304 (200417) JA 55

KR 406689 B 20031121 (200423) KO

CN 1258234 C 20060531 (200661) ZH

JP 2006289985 A 20061026 (200670) JA 17

JP 3885100 B2 20070221 (200716) JA 18

ADT WO 2002015299 A1 WO 2001-KR1374 20010811; KR 2002013634 A
 KR 2000-46735 20000812; KR 373204 B KR 2000-46735 20000812
 ; KR 2002071203 A KR 2001-11191 20010305; KR 406689 B KR
 2001-11191 20010305; CN 1388993 A CN 2001-802389 20010811;
 CN 1258234 C CN 2001-802389 20010811; EP 1310005 A1 EP
 2001-958588 20010811; US 20020187401 A1 WO 2001-KR1374
 20010811; EP 1310005 A1 WO 2001-KR1374 20010811; JP
 2004506542 W WO 2001-KR1374 20010811; JP 2004506542 W JP
 2002-520328 20010811; JP 2006289985 A Div Ex JP 2002-520328
 20010811; US 20020187401 A1 US 2002-110047 20020405; JP
 2006289985 A JP 2006-135816 20060515; JP 3885100 B2 WO 2001-KR1374
 20010811; JP 3885100 B2 JP 2002-520328 20010811

FDT KR 373204 B Previous Publ KR 2002013634 A; KR 406689 B
 Previous Publ KR 2002071203 A; EP 1310005 A1 Based on WO 2002015299
 A; JP 2004506542 W Based on WO 2002015299 A; JP 3885100 B2
 Previous Publ JP 2004506542 W; JP 3885100 B2 Based on WO 2002015299
 A

PRAI KR 2001-11191 20010305
 KR 2000-46735 20000812

AB WO 2002015299 A1 UPAB: 20060119
 NOVELTY - The composite film consists of a **polymeric** support
 layer film (i1) whose one or more sides is provided with a **porous**
 gellable **polymer** layer (i2). The support layer film and the
porous gellable polymer layer are united with each other
 without an interface (i3) between them.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
 following:
 (i) preparation of the multicomponent composite film by preparing a
polymeric support layer film, dissolving a gellable
polymer in a solvent for preparing a gellable **polymer**
 solution and forming a gellable **polymer** layer on one or more
 sides of the support layer film, forming the **polymer** layer by
 coating the support layer film with the **polymer** solution
 and forming multiple layers, stretching the multiple layers and subjecting
 to heat setting;
 (ii) **polymer** separator;
 (iii) **polymer electrolyte** system consisting of
 a porous support layer film, a multi component composite
 separator, a salt represented by A+B- and an organic solvent (A+ is at
 least one selected from the group consisting of alkali metallic cations
 including Li+, Na+, K and their derivative, and B- is at least one
 selected from the group consisting of PF6-, BF4-, Cl-, AsF6-, CH3CO2-,
 CF3SO3-, N(CH3SO2)2- and C(CH3SO2)3-); and
 (iv) **electrochemical** device comprising the
polymer electrolyte system.
 USE - Used for **polymer electrolyte** for

electrochemical devices, separators such as ultrafiltration membrane, gas separation membrane, pervaporation membrane, reverse osmosis membrane and separator for **electrochemical** device.

ADVANTAGE - The composite film has excellent **electrochemical** stability, adhesion to **electrode**, good wet-out rate of **electrolyte**, good ionic conductivity and mechanical properties. The composite film is prepared without extraction or removal process of plasticizer.

DESCRIPTION OF DRAWINGS - The figure shows a cross-section of the multicomponent composite film structure.

Support layer film (11)

Polymer layer (12)

Interface (13)

TECH

POLYMERS - Preferred Support Layer: The support layer film consists of high-density **polyethylene**, low-density **polyethylene**, linear low-density **polyethylene**, **polypropylene**, high-crystalline **polypropylene**, **polyethylene-propylene copolymer**, **polyethylene-butylene copolymer**, **polyethylene-hexene copolymer**, **polyethylene-octene copolymer**, **polystyrene-butylene-styrene copolymer**, **polystyrene-ethylene-butylene-styrene copolymer**, **polystyrene**, **polyphenylene oxide**, **polysulfone**, **polycarbonate**, **polyester**, **polyamide**, **polyurethane**, **polyacrylate**, **polyvinylidene chloride**, **polyvinylidene fluoride**, **polysiloxane**, **polyolefin ionomer**, **polymethyl pentene**, hydrogenated oligocyclopentadiene (HOCPP) and/or their **copolymers** or derivatives. The high crystalline **polypropylene** has at least one property selected from the group consisting of a density equal to or greater than 0.905 g/cc, a melting point equal to or greater than 164 degreesC, a crystallization temperature equal to or greater than 125 degreesC, crystallinity equal to or greater than 50%, isotacticity (or a pentad ratio) equal or greater than 96% and atactic ratio less than 5%. The support layer film is a blended film or a laminated film. The **pore** size of the support layer film is 0.001-10 microns and its thickness is 1-50 microns. The **pore** size of the **polymer** layer is 10 microns or less and its thickness is 0.01-25 microns.

Preferred Polymer Layer: The **polymer** layer consists of **polyvinylidene fluoride**, **polyvinylidene fluoride-chlorofluoroethylene copolymer**, **polyvinylidene fluoride-hexafluoropropylene copolymer**, **polyethylene oxide**, **polypropylene oxide**, **polybutylene oxide**, **polyurethane**, **polyacrylonitrile**, **polyacrylate**, **polymethyl methacrylate**, **polyacrylic acid**, **polyamide**, **polyacrylamide**, **polyvinyl acetate**, **polyvinylpyrrolidone**, **polytetraethylene glycol diacrylate**, **polysulfone**, **polyphenylene oxide**, **polycarbonate**, **polyester**, **polyvinylidene chloride**, **polysiloxane**, **polyolefin ionomer** and/or their **copolymer** or derivatives. The gellable **polymer** layers comprises at least one lithium salt selected from the group consisting of LiSCN, LiClO₄, LiCF₃SO₃, LiAsF₆, LiN(CF₃SO₂)₂, and LiBF₄ or comprises at least one **porous** inorganic particle selected from the group consisting of SiO₂, TiO₂, Al₂O₃, MgO and BaO₃. Preferred Process: The **polymer** layer is formed by coating the gellable **polymer** solution on one or both

sides of the support layer film, drying the **coated** support layer film and **coating** a release film with the **polymer** solution to form a **polymer** layer. The **coated** film is dried. Desorption of gellable **polymer** from the release film is performed and the desorbed film is heat-melted. The **coating** process is performed by dip **coating**, spray **coating**, dye **coating** or roll **coating**. The drying process is performed at a relative humidity of 1-100% under an atmosphere containing nitrogen, oxygen, carbon dioxide and/or air. High-temperature stretching is performed after the low-temperature stretching of the multiple layer. The low-temperature stretching is performed at 0-50 degreesC along one direction in a roll or a stretching machine. The high temperature stretching is uniaxially or biaxially performed in a roll or stretching machine at 50 degreesC to the melting point of the gellable **polymer** layer. The heat setting is performed at 50 degreesC to the melting point of **polymer** layer, for 5 seconds to 1 hour. The support layer film is prepared by injecting the **polymer** to an extruder equipped with a T-die or a tubular die in order to extrude the **polymer** and annealing it in a dry oven at room temperature to a **polymer** melting point of the support layer or is prepared by irradiating ion beams under a reactive gas atmosphere on either or both sides of the support layer film. The concentration of the gellable **polymer** solution is 0.1-90 wt.%

INORGANIC CHEMISTRY - Preferred Ion Irradiation: The ion beam irradiation is performed at a low rate of 105-1020 ions/cm² by injecting reactive gases such as helium, hydrogen, oxygen, nitrogen, carbon dioxide, ammonia, carbon monoxide, methane and/or **chlorofluoro** carbon at a flow rate of 0.5-20 ml/min in a vacuum chamber at 10⁻¹ to 10⁶ torr. One or more particles of **electrons**, hydrogen, helium, oxygen, nitrogen, carbon dioxide, air, **fluoride**, neon, argon, krypton and nitrogen oxide are activated such that the particle has an energy of 10⁻² to 10⁶ keV, to form an ion beam.

ORGANIC CHEMISTRY - Preferred Solvent: The solvent is 1-methyl-2-pyrrolidone (NMP), acetone, ethanol, n-propanol, n-butanol, n-hexane, cyclohexanol, acetic acid, ethyl acetate, diethyl ether, dimethyl formamide (DMF), dimethylacetamide (DMAc), dioxane, tetrahydrofuran (THF), dimethyl **sulfoxide** (DMSO), cyclohexane, benzene, toluene, xylene, water and/or their derivatives.

Preferred Electrolyte System: The air permeability of the separator is 100-20,000 seconds/100cc. The organic solvent is propylene carbonate (PC), ethylene carbonate (EC), diethyl carbonate (DEC), dimethyl carbonate (DMC), dipropyl carbonate (DPC), dimethyl **sulfoxide**, acetonitrile, dimethoxyethane, diethoxy ethane, tetra- hydrofuran, N-methyl-2-pyrrolidone (NMP) and/or ethyl methyl carbonate (EMC).

MECHANICAL ENGINEERING - Preferred Device: The **electrochemical** device contains a super capacitor, an ultra capacitor, a secondary battery, a primary battery, a fuel battery, a sensor, an **electrolyzer** or an **electrochemical** reactor, which comprises the **polymer electrolyte** system.

ABEX EXAMPLE - A high crystalline **polypropylene** was used as a support layer film, and a **polyvinylidene fluoride** -chloro-tri-fluoroethylene copolymer was used as a gellable **polymer** layer. A high crystalline **polypropylene** was used for a material of a precursor film. It had a melt index of 2.0 g/10 minutes, a density of 0.91 g/cc, a melting point of 166.5 degreesC which was measured with DSC, a crystallization temperature of 116.5 degreesC, a crystallinity of 57%, an isotacticity of 98% which was measured with C13 nuclear magnetic resonance (NMR), and an atactic fraction of about 2% which was measured after being dissolved in xylene. The precursor film was prepared from the high crystalline

polypropylene with use of a single screw extruder. The extrusion temperature and cooling-roll temperature were respectively 220 degreesC and 80 degreesC. The take-up speed was 20 m/minute, and the draw down rate (DDR) was 60. The precursor film was annealed in a dry oven at 150 degreesC for an hour. After annealing, the solution that was dissolved in acetone was dip coated on both sides of the prepared precursor film. The coating was performed under air while maintaining 60% relative humidity, and the acetone was vaporized at the same condition of 60% relative humidity. The coated precursor film was mono-axially low-temperature-stretched to 50% of the stretching ratio based on the initial length of the film at room temperature, and it was further mono-axially low-temperature-stretched to 100% of the stretching ratio based on the initial length of the film at room temperature. After low-temperature-stretching, the low-temperature-stretched precursor film was heat-set at 140 degreesC under tension for 10 minutes, and it was cooled in order to prepare a multi-component composite film. Air permeability, interfacial adhesion strength and wet-out rate of electrolyte were evaluated and found to be 520 seconds/100cc, 160 gf and 9 seconds, respectively.

L131 ANSWER 13 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 2001-607384 [69] WPIX
 CR 2001-529860; 2001-616142
 DNC C2001-180470 [69]
 DNN N2001-453408 [69]
 TI Formation of gas diffusion **electrode**, for **polymer electrolyte** membrane fuel cells, by treating **electrode** formed from mixture of **polymer electrolyte**, **electrocatalyst** and nanosized **pore-former**, to remove **pore-former**
 DC A14; A85; L03; X16
 IN APFLEBY A J; GAMBURZEV S
 PA (TEXA-C) UNIV TEXAS A & M SYSTEM
 CYC 92
 PIA WO 2001065617 A2 20010907 (200169)* EN 70[26] <--
 AU 2001068024 A 20010912 (200204) EN <--
 US 20010031389 A1 20011018 (200211) EN 44 <--
 US 6649299 B2 20031118 (200376) EN
 AU 2001268024 AB 20051020 (200615) EN
 ADT WO 2001065617 A2 WO 2001-US4486 20010209; US 20010031389 A1
 Provisional US 2000-181893P 20000211; US 20010031389 A1
 Provisional US 2000-181894P 20000211; US 20010031389 A1
 Provisional US 2000-182010P 20000211; US 6649299 B2 Provisional
 US 2000-181893P 20000211; US 6649299 B2 Provisional US
 2000-181894P 20000211; US 6649299 B2 Provisional US 2000-182010P
 20000211; US 20010031389 A1 US 2001-779868 20010208; US
 6649299 B2 US 2001-779868 20010208; AU 2001068024 A AU
 2001-68024 20010209; AU 2001268024 AB AU 2001-268024 20010209
 FDT AU 2001068024 A Based on WO 2001065617 A; AU 2001268024 AB Based on WO
 2001065617 A
 PRAI US 2001-779868 20010208
 US 2000-182010P 20000211
 US 2000-181894P 20000211
 US 2000-181893P 20000211
 AB WO 2001065617 A2 UPAB: 20050902
 NOVELTY - An **electrode** is formed on a **substrate** by
 applying a mixture comprising **polymer electrolyte**, **electrocatalyst** and nanosized **pore**
-former to the **substrate**. The obtained **electrode** is
 then treated to remove the nanosized **pore-former**, to obtain gas

diffusion electrode.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for;

(1) Formation of membrane **electrode** assembly involves forming an **electrode** on the **substrate**, attaching **electrode** to a membrane to form membrane **electrode** assembly and treating the **electrode** to remove **pore-former**;

(2) Formation of gas permeable layer for use in fuel cells involves applying nanosized **pore-former** to a composition and treating the composition to remove nanosized **pore-former**;

(3) **Electrode** comprising **polymer electrolyte**, **electrocatalyst** and nanosized **pores**;

(4) Fuel cell comprising an **electrode**; and

(5) Fuel cell stack comprising a layer having nanosized **pores**.

USE - For **polymer electrolyte** membrane fuel cells (claimed) used for power generation.

ADVANTAGE - The gas diffusion **electrode** with high performance is provided. The fuel cell stack that provides electrical power in a lighter package, is provided using the gas diffusion **electrode**.

TECH

INORGANIC CHEMISTRY - Preferred Composition: The mixture contains 20-60 weight% (wt.%) (preferably, 35-45 wt.%) of nanosized **pore-former** such as fumed silica.

Preferred Process: The **electrode** is treated chemically by contacting it with an alkali metal hydroxide solution, to remove the **pore-former**. The activation of **polymer electrolyte** present in the **electrode** is carried out by contacting the **electrode** with an acidic solution. The mixture comprising **polymer electrolyte**, **electrocatalyst** and nanosized **pore-former** is applied to the **substrates** by rolling, calendaring, pressing, printing, spraying, brushing, **electrostatic** spraying, dry filtering or wet filtering.

Preferred Substrate: The **substrate** is carbon cloth, carbon paper, porous carbon or porous metal (which comprises a three-dimensional reticulated metal structure). The porous metal is copper, nickel, aluminum, titanium or aluminum-titanium alloy.

Preferred Membrane: The membrane is **polymer electrolyte** membrane or **fluorinated sulfonic acid** membrane.

Preferred Layer: The gas permeable layer is an intermediate layer or hydrophilic layer comprising **perfluorosulfonic acid polymer** and carbon black.

ABEX

EXAMPLE - **Electrode** with a support layer loaded with 10 mg/cm² carbon (acetylene black) and catalyst layer with 4 mg/cm² platinum as 60 weight% (wt.%) platinum on carbon, with 6 wt.% of polytetrafluoroethylene, was prepared using dry method. The prepared **electrode** was tested in small 5 cm² cell with a membrane **electrode** assembly using Nafion 112 (RTM) **electrolyte** and 3.9 mg/cm² platinum **electrodes**. The steady-state cell potential over 100 hours was 0.68 V at current density of 0.7 A/cm². The effect of changing the platinum loading of the supported catalyst was then investigated using GORE-SELECT (RTM) membrane of 20 micron thickness. Cathode with total platinum loading of 1.4 mg/cm² but with differing wt.% platinum on carbon Vulcan XC-72R (RTM) was prepared and tested in 5 cm² test cells. The anode platinum loading was maintained at 0.3 mg/cm². A graph of cell potential versus current density was

plotted, and the result showed that a membrane **electrode** assembly with 60 wt.% platinum on carbon **electrocatalyst** showed 50 mV higher potential at constant current density than a membrane **electrode** assembly with 40 wt.% platinum on carbon **electrocatalyst**. The improvement mainly results from higher platinum utilization in the 60 wt.% platinum on carbon **electrocatalyst**.

L131 ANSWER 14 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 1999-418882 [35] WPIX
 DNC C1999-123128 [35]
 DNN N1999-312681 [35]
 TI Sealing porous surface, used in e.g.
 electronic parts
 DC A14; A32; A82; G02; L03; M11; M13; P42
 IN BIRCHENALL A K; BROTHERS P D; HRIVNAK J A; MERIGOLD R J; MORGAN R A
 PA (DUPO-C) DU PONT DE NEMOURS & CO E I
 CYC 20
 PIA WO 9932234 A1 19990701 (199935)* EN 25[6] <--
 EP 1042078 A1 20001011 (200052) EN <--
 ADT WO 9932234 A1 WO 1998-US26903 19981218; EP 1042078 A1 EP
 1998-964057 19981218; EP 1042078 A1 WO 1998-US26903 19981218
 FDT EP 1042078 A1 Based on WO 9932234 A
 PRAI US 1997-68431P 19971222
 AB WO 1999032234 A1 UPAB: 20050521
 NOVELTY - Coating a **substrate** comprises
 applying a porous coating, and then
 applying a fluoropolymer solution to seal the pores and
 provide a nonporous **coated substrate**.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
 following:
 (1) a **coated article**; and
 (2) a **coating process** comprising **applying to**
 the **substrate a coating** that contains pores and
 comprises 5-30 weight% **polymeric material**, and then removing the
 polymeric material to form voids in the **coating**.
 USE - Used for **coating vessels and electronic**
 parts (claimed). Also used for **coating pipes, valves, bake ware,**
 cookware, hot plates, saws, dies, tools and ship bottoms.
 ADVANTAGE - The process seals the pores and crevices of thermally
 sprayed **coatings**, inhibiting corrosion and blistering, and
 extending the lifetime of process equipment by at least a factor of 8 to
 reduce downtime.

TECH
 INORGANIC CHEMISTRY - Preferred Material: The **substrate** is
 carbon steel, stainless steel, aluminium or
 copper metal, selected from alumina or silica ceramic, or a composite of
 metal and a porous surface layer. The
 fluoropolymer coating seals the pores of the
 porous surface layer. The porous
 coating comprises metal, ceramic, polymer and/or
 composite.
 POLYMERS - Preferred Coating: The porous
 coating on the **substrate** comprises polymer.
 The polymeric material contained in the coating having
 pores is a fluoropolymer which is soluble in
 perfluorinated solvents.
 Preferred Fluoropolymer: The fluoropolymer solution
 comprises a fluoropolymer of molecular weight 200000-400000, and
 is preferably a copolymer of tetrafluoroethylene (TFE)

and **perfluoroethyl vinyl ether (PEVE)**. The **fluoropolymer** includes **copolymers** of TFE with functional or nonfunctional comonomers such as 2-8 C **fluoroolefin** and **fluorinated** alkyl vinyl ether having a 1 C or 3-5 C alkyl. Nonfunctional monomers include **hexafluoropropylene (HFP)**, **chlorotrifluoroethylene (CTFE)**, **PEVE**, **perfluoromethyl vinyl ether (PMVE)** and **perfluoropropylene vinyl ether (PPVE)**. Functional monomers include **perfluoro vinyl ether (EVE)**, **EVE-carbamate** of formula (I), **PSEPVE** of formula (II), **8CNVE** of formula (III), **EVE-triazine** of formula (IV), **EVE-CN** of formula (V), **EVE-OH** of formula (VI), **EVE-P** (VII) and/or **EVE-COOH** of formula (VIII).
 CF2CFOCF2-CFCF30-CF2CF2COOCH3 (I)
 CF2CFOCF2CF2CFCF3OCF2CF2SO2F (II)
 CF2CFOCF2CF2CFCF3OCF2CF2CN (III)
 N3(CF2CFOCF2CF2CFCF3OCF2CF2)3 (IV)
 CF2CFOCF2CF2CFCF3OCF2CF2CN (V)
 CF2CFOCF2CF2CFCF3OCF2CF2CH2OH (VI)
 CF2CFOCF2CF2CFCF3OCF2CF2CH2PO2(OH)2 (VII)
 CF2CFOCF2CF2CFCF3OCF2CF2CH2COOH (VIII)

METALLURGY - Preferred Coating: The first porous coating is applied to the substrate by thermal spray deposition or by electroplating. The porosity of a porous metal coating is decreased to less than 0.025% after coating with the fluoropolymer solution, in areas that are penetrated by the solution, and the corrosion resistance of the coated substrate is improved by a factor at least 8 time units. The porous coating may additionally contain fluoropolymer, and after the fluoropolymer coating has been applied, sintering is carried out to join the resulting fluoropolymer layer to the fluoropolymer in the porous coating.

In the second process, the polymeric material is removed from the porous coating by heating the coated substrate to 300 degrees C for 30 minutes. Alternatively, when the polymeric material is a perfluorinated solvent soluble fluoropolymer, the fluoropolymer is dissolved in the solvent, and the fluoropolymer solvent mix flows through the coating to fill the voids at a coating-substrate interface.

ABEX EXAMPLE - Ammonium perfluorononanoate (5 g) was added into deaerated demineralised water (2200 ml) at atmospheric pressure. The mixture was agitated at 100 rpm and heated to 90 degrees C with the pressure increased to 400 psig by adding a mixture of 17.2 wt.% TFE, 51 wt.% PMVE and 21.8 wt.% PEVE. An initial charge of a 1.5 g/l solution of ammonium persulphate in water (30 ml) was added. At start of reaction shown by a 10 psi pressure drop, the same initiator solution was fed at 2 ml/minute and 600 g monomer mixture comprising 62 pts. wt. TFE, 23 pts. wt. PMVE and 15 pts. wt. PEVE, was fed to maintain pressure at 400 psig. When the pressure dropped to 250 psig, the product dispersion obtained had a solids content of 22.3 wt.%. - The recovered copolymer comprised 56.3 pts. wt. TFE, 29.9 pts. wt. PMVE and 18.8 pts. wt. PEVE, and had a weight average molecular weight (Mw) = 279000. Cleaned test panels comprising plates of carbon steel coated with Inconel Alloy 625 (RTM: corrosion resistant alloy) by a high velocity oxy-fuel technique, were sealed by dipping in a 3 wt.% solution of the obtained polymer in PF-5080 (RTM: perfluorooctane), drying at 150 degrees C, and repeating the dipping and drying. The sealed panels survived 24 weeks of exposure to 1% sulphuric acid and its vapour at 60 degrees C, while unsealed panels failed by blistering

after 3 weeks.

L131 ANSWER 15 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
 AN 1998-388430 [33] WPIX
 DNC C1998-117632 [33]
 DNN N1998-302837 [33]
 TI Gas diffusion **electrode** comprises gas diffusion layer and
porous ion-exchange resin-containing catalyst layer - with
 improved conductivity, output density and water retention, lowered
 membrane resistance, useful for solid **polymer**
electrolyte-type fuel cells
 DC A85; L03; X16
 IN TOTSUKA K
 PA (NIST-C) JAPAN STORAGE BATTERY CO LTD; (TOTS-I) TOTSUKA K; (YUAS-C) GS
 YUASA CORP KK
 CYC 5
 PIA WO 9829916 A1 19980709 (199833)* JA 30[8] <--
 JP 10241701 A 19980911 (199847) JA 12 <--
 EP 949703 A1 19991013 (199947) EN <--
 CN 1242111 A 20000119 (200023) ZH <--
 US 20020004159 A1 20020110 (200206) EN <--
 US 6592934 B2 20030715 (200348) EN <--
 CN 1230933 C 20051207 (200654) ZH
 JP 3903562 B2 20070411 (200726) JA 15
 ADT WO 9829916 A1 WO 1997-JP4911 19971226; CN 1242111 A CN
 1997-181058 19971226; CN 1230933 C CN 1997-181058 19971226;
 EP 949703 A1 EP 1997-950441 19971226; JP 10241701 A JP
 1997-370336 19971226; EP 949703 A1 WO 1997-JP4911 19971226;
 US 20020004159 A1 WO 1997-JP4911 19971226; US 6592934 B2 WO
 1997-JP4911 19971226; US 20020004159 A1 US 1999-331850
 19990628; US 6592934 B2 US 1999-331850 19990628; JP 3903562
 B2 JP 1997-370336 19971226
 FDT EP 949703 A1 Based on WO 9829916 A; US 6592934 B2 Based on
 WO 9829916 A; JP 3903562 B2 Previous Publ JP 10241701 A
 PRAI JP 1996-357974 19961227
 AB WO 1998029916 A1 UPAB: 20060114
 A gas diffusion **electrode** for solid **polymer**
electrolyte-type fuel cells comprises a gas diffusion layer and
 catalyst layer which is composed of a catalyst and **porous**
 ion-exchange resin. Also claimed are the following: (i) processes for
 producing the **electrode** by coating the catalyst layer
 precursor made from some catalyst bodies with the ion-exchange resin, then
 soaking in a polar organic solvent other than alcoholic hydroxide, and
 allowing the resin to solidify and perforate; (ii) a joined body by fixing
 the **electrode** to at least 1 side of the solid **polymer**
electrolyte membrane; and (iii) a solid **polymer**
electrolyte membrane which is made from ion-exchange resin as the
 essential ingredient and with **pores**.
 USE - The gas diffusion **electrode** is particularly useful
 for solid **polymer electrolyte**-type fuel cells
 (claimed).
 ADVANTAGE - Said **electrode** has enhanced conductivity,
 output density and water retention, as well as lowered membrane
 resistance.

L131 ANSWER 16 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on SEN
 AN 1998-042471 [04] WPIX
 DNN N1998-833953 [04]
 TI Cylindrical proton exchange membrane fuel cell manufacture method -
 disposing cathode comprising proton exchange catalyst around and in ionic

communication with membrane outer **surface** of inner
polymer electrolyte membrane

DC X16

IN BASS E A; CAMPBELL J; MERRITT P M; SHARP C A; WALL C M

PA (SWRI-C) SOUTHWEST RES INST

CYC 70

PIA WO 9747052 A1 19971211 (199804)* EN 48[4] <--

AU 9733766 A 19980105 (199821) EN <--

US 6001500 A 19991214 (200005) EN <--

ADT WO 9747052 A1 WO 1997-US9659 19970605; US 6001500 A Provisional

US 1996-19182P 19960605; AU 9733766 A AU 1997-33766

19970605; US 6001500 A US 1997-869795 19970605

EDT AU 9733766 A Based on WO 9747052 A

PRAI US 1996-19182P 19960605

US 1997-869795 19970605

AB WO 1997047052 A1 UPAB: 20060113

A slowly rotating lathe (10) allows the controlled application

of low viscosity solutions while casting the **polymer**

electrolyte membrane on a graphite core. The preferably

porous, moulded or machined graphite cylinder **electrode**

(12) is supported in the lathe e.g. by glass rods (18). Rolled sheet

construction is also possible.

A solution is used to **deposit** catalyst particles onto the

electrode surface and, after drying, a solid

polymer electrolyte membrane layer is formed by

applying a stock **ionomer** solution (28). An outer

catalyst layer is formed and an outer **electrode** (30), preferably

carbon tow, is wound round the assembly.

ADVANTAGE - Provides method of manufacturing effective cylindrical
fuel cell for low temperature, fast transient response and high energy
density.

L131 ANSWER 17 OF 20 WPX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 1997-513313 [48] WPX

DNC C1997-163869 [48]

DNN N1997-427260 [48]

TI Measuring specific **surface** area of catalyst available for
reaction in fuel cells - comprises reducing first and second
electrode materials to be compared, exposing them to carbon
mono:oxide and subtracting obtained values

DC A35; A85; J02; L03; S03; W06; X16; X21

IN EDA N; FUKUOKA H; FUKUOKA Y; SUGAWARA Y; UCHIDA M

PA (MATU-C) MATSUSHITA DENKI SANGYO KK; (MATU-C) MATSUSHITA ELECTRIC IND CO
LTD

CYC 4

PIA CA 2195281 A 19970717 (199748)* EN 26[4] <--

DE 19701174 A1 19971030 (199749) DE 10[4] <--

JP 09257687 A 19971003 (199750) JA 8[5] <--

US 5866423 A 19990202 (199912) EN <--

US 6242260 B1 20010605 (200133) EN <--

CA 2195281 C 20041026 (200471) EN

ADT CA 2195281 A CA 1997-2195281 19970116; JP 09257687 A JP

1996-294722 19961107; DE 19701174 A1 DE 1997-19701174

19970115; US 5866423 A US 1997-783577 19970115; US 6242260

B1 Div Ex US 1997-783577 19970115; US 6242260 B1 US

1998-181741 19981028

EDT US 6242260 B1 Div ex US 5866423 A

PRAI JP 1996-294722 19961107

JP 1996-4570 19960116

AB CA 2195281 A UPAB: 20060113

Measuring the specific **surface area (SSA)** available for reaction of a noble metal catalyst of an **electrode material powder** for a **polymer electrolyte membrane fuel cell (PEMFC)** comprises: (a) reducing a first **electrode material powder** comprising a noble metal catalyst on a powdered carbon carrier; (b) reducing a second **electrode material powder** comprising a noble metal catalyst covered with **polymer electrolyte (PE)** on a powdered carbon carrier; (c) exposing the first **electrode powder** to carbon monoxide and measuring the total SSA of the noble metal catalyst from the amount of carbon monoxide adsorbed; (d) exposing the second **electrode powder** to carbon monoxide and measuring the SSA of the catalyst from carbon monoxide adsorption as above; and (e) obtaining the available SSA by subtracting the value obtained in step (d) from the value obtained in step (c).
Also claimed is an **electrode** for a PEMFC having an **electrode material** comprising: (i) a noble metal catalyst powder; and (ii) a **polymer electrolyte**; such that the utilisation ratio of the catalyst is at least 40% of the saturation utilisation value.

USE - Used for determining the utilisation ratio of a noble metal catalyst in a **polymer electrolyte**. PEMFCs are used as the power supply aboard spacecraft and also for consumer uses, e.g. as the driving power source for electric vehicles and boats, and as portable power supplies.

ADVANTAGE - The SSA of catalyst available for reaction is measured accurately to allow control of the catalyst utilisation ratio. This control provides an **electrode material** with excellent polarisation characteristics.

L131 ANSWER 18 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP ON STN
AN 1997-308242 [28] WPIX
DNC C1997-099123 [28]
DNN N1997-255412 [28]

TI Solid **polymer electrolyte** type fuel battery - has per:**fluorocarbon:sulphonic acid resin*** impregnated into and deposited on porous base matter, giving composite **polymer membrane**, lowering **electrolyte** membrane resistance.

DC A85; I03; X16
IN HIRATA I; MORIGA T
PA (MITO-C) MITSUBISHI JUKOGYO KK
CYC 1

PIA JP 09120827 A 19970506 (199728)* JA 6[0] <--
ADT JP 09120827 A JP 1995-275444 19951024
PRAI JP 1995-275444 19951024
AB JP 09120827 A UPAB: 20050518

Perfluorocarbonsulphonic acid resin is impregnated into and deposited on the porous base matter to give the combined **polymer membrane**.

USE - Used as a solid **polymer electrode** membrane.

ADVANTAGE - The combined **polymer membrane** is used as a solid **polymer electrode** membrane of the fuel battery in which resistance of **electrolyte** membrane is lowered.

L131 ANSWER 19 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP ON STN
AN 1995-199628 [26] WPIX
DNC C1995-092257 [26]
DNN N1995-156833 [26]
TI Non-porous **perfluorinated ion-exchange membrane** mfr.

- comprises mixing **perfluorinated polymer** solution with ionic **surfactant** and casting mixture to produce non-porous **perfluorinated** film membrane

DC A91; E19; J01; X25
IN KOVAL C; NOBLE R D; PELLEGRINO J; RABAGO R
PA (COLS-C) UNIV COLORADO FOUND INC
CYC 1
PIA US 5417832 A 19950523 (199526)* EN 10[2] <--
ADT US 5417832 A US 1992-935016 19920825
PRA1 US 1992-935016 19920825
AB US 5417832 A UPAB: 20050702

Production of a non-porous **perfluorinated** ion-exchange membrane comprises: (a) mixing a **perfluorinated polymer** solution with an ionic **surfactant** solution such that the ionic **surfactant** comprises 1-60 mol.% total solids (in the cast membrane); and (b) casting the above mixture to produce a non-porous **perfluorinated** film membrane in which the **surfactant** is incorporated into the microstructure of the membrane. Also claimed is a membrane prepared by the above process and having improved transport characteristics. Also claimed is a process for increasing the ion-exchange site density of **perfluorinated** ion-exchange membranes.

USE - The membranes can be used to separate NH₃, CO₂, and H₂S from gaseous and liquid mixts., in the production of NaOH and Cl₂ gas from the **electrolysis** of NaCl, to dehydrate medical and industrial gases, to separate water from organic solvents including azeotropes, to separate isomers, to separate toxic and radioactive metals from aqueous streams, etc.. They may also be used as protective **coatings** on garments, as ion-specific **coatings** on **electrochemical** sensors and in solid **polymer electrolyte** H₂/O₂ fuel cells.

ADVANTAGE - Membranes containing the **surfactant** have improved microstructural crystallinity, decreased equivalent weights., improved ion-exchange site density (claimed) and improved transport properties (claimed).

L131 ANSWER 20 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1993-295215 [37] WPIX
CR 1994-182603
DNC C1993-130957 [37]
DNN N1993-227477 [37]
TI Fuel cell having solid per:fluoro copolymer **electrolyte** membrane - enabling efficient **electrolyte** generation at near ambient temps. and pressures without humidification
DC A14; A85; L03; X16
IN DHAR H P
PA (BCST-N) BCS TECHNOLOGY INC
CYC 1
PIA US 5242764 A 19930907 (199337)* EN 9[4] <--
ADT US 5242764 A US 1991-809581 19911217
PRA1 US 1991-809581 19911217
AB US 5242764 A UPAB: 20050823

Fuel cell (5) generating electricity from reaction between fuel and oxidant sources (10,12) comprises a pair of **porous** gas diffusion **electrodes** (18,20) defining an electric field, first and second **electrolytes** (22,24) deposited on respective **electrodes**, and an **electrolyte** membrane (30) with a central hole (32) positioned between and in contact with both **electrolyte** deposits. Both **electrolyte** deposits and the **electrolyte** membrane are perfluorocarbon **copolymer**, portion conducting

material, the **electrolyte deposits** most pref. comprising 10 - 20 mg per 5 cm² area of a 5 percent solution of **Nafion** (RTM for Dupont **perfluorocarbon**). The **electrodes** are a fuel **electrode** and an oxidant **electrode**, each having a distribution member (14,16) in flow communication for supplying gaseous fuel and oxidant respectively and an **electrolyte** member between and in contact with both of them comprising an **electrolyte** membrane sheet having a central hole and **electrolyte deposited** on opposite **surfaces**

USE/ADVANTAGE - Fuel cell employs a solid **polymer electrolyte** membrane which does not need humidification of itself or the reactant gases to operate efficiently. Consequently, it is less complex in structure and can have much thinner **electrolyte** layers and, therefore, much reduced ohmic resistance enabling it to operate at near ambient temps. and pressures. - .Drf

=> d his

(FILE 'HOME' ENTERED AT 14:36:52 ON 01 NOV 2007)
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 14:37:01 ON 01 NOV 2007

```

L1      1 S US20050014050/PN OR US2003-620675#/AP,PRN
        E PUNGSALAN/AU
L2      21 S E4,E5
        E MARDILOVICH/AU
L3      137 S E14-E19
L4      53 S E9-E13
        E HERMAN/AU
L5      15 S E3
        E HERMAN G/AU
L6      95 S E3,E11
        E HERMAN GREG/AU
L7      85 S E5-E8
        E HEWLET/CO
L8      5295 S E4,E6-E143
        E E22+ALL
L9      5614 S E2+RT OR E2-E57/PA,CS
        E HEWLET/PA,CS
L10     1 S E5-E8
L11     2320 S E15-E180
L12     2392 S E181-E276
L13     1091 S E277-E336
L14     244 S E337-E408
L15     531 S E409-E480
L16     353 S E481-E552
L17     86 S E553-E595, E599-E603
L18     5399 S (HEWLET?(L) PACKAR?)/PA,CS,CO
L19     11188 S NAFION
L20     286 S FLEMION
L21     7 S DOW XUS
L22     0 S DOW X US
        E FLUOROPOLYMER/CT
        E E4+ALL
L23     5363 S E2
L24     5412 S FLUOROPOLYMER?/CW,CT (L) IONOMER?
L25     6567 S FLUOROPOLYMER?/CW,CT (L) (SULFO? OR SULPHO?)
        E FLUOROPOLYMERS/CT

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      E E3+ALL
      E E4
      E FLUOROPOLYMERS,/CT
L26   3459 S (E13 OR E14) (L) IONOMER?
L27   4075 S (E13 OR E14) (L) (SULFO? OR SULPHO?)

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FILE 'REGISTRY' ENTERED AT 14:47:18 ON 01 NOV 2007

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      E NAFION
L28   257 S E3
      E NAFION/ENTE
L29   10 S E3
      E FLEMION
L30   55 S E3
      E FLEMION/ENTE
L31   3 S E3
      E DOW XUS/CN
      E DOW-XUS/CN
L32   0 S DOW(L)XUS
      E XUS
L33   1 S 137398-84-6
      E XUS
L34   102 S E3
      E XUS/ENTE
L35   5 S E3

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FILE 'HCAPLUS' ENTERED AT 14:50:50 ON 01 NOV 2007

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L36   265718 S L28-L35
L37   274259 S L19, L20, L21, L23-L27, L36
      E ELECTRODEPOSIT/CT
L38   57240 S E5-E32, E36
L39   15831 S E37-E71
      E E5+ALL
L40   65713 S E10+OLD, NT
      E E32+ALL
L41   15940 S E3+OLD
      E E11+ALL
      E E31+ALL
L42   17436 S E2+OLD
L43   1716 S L37 AND L38-L42
L44   844 S L37 AND C25D/IPC, IC, ICM, ICS
L45   1615 S L37 AND (?ELECTRODEPOS? OR ?ELECTROPLAT? OR ?ELECTROCOAT?)
L46   1815 S L37 AND (?ELECTROPHOR? OR ?ELECTROLY?) (S) (DEPOS? OR COAT? OR
L47   4306 S L43-L46
L48   556 S L47 AND IONOMER?
L49   4306 S L47, L48
      E POLYMER ELECTROLYTE/CT
      E E5+ALL
L50   4677 S E9
      E E8+ALL
L51   5537 S E5, E6
      E E7+ALL
      E E13+ALL
L52   18727 S E5+OLD
      E ELECTROLYTES/CT
      E E3+ALL
      E E10+ALL
L53   9659 S E5
      E E4+ALL
      E E12+ALL
L54   5519 S E11+OLD

```



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L55      21880  E E14+ALL
           S EB
           E ELECTROLYTES/CT
           E E3+ALL
           E E15+ALL
L56      1711  S E13
L57      592  S L49 AND L50-L56
L58      920  S L49 AND ?POLYM?(L)?ELECTROLYTE?
L59      1120  S L57, L58
L60      245  S L59 AND PY<=2003 NOT P/DT
L61      485  S L59 AND (PD<=20030715 OR PRD<=20030715 OR AD<=20030715) AND
L62      730  S L60, L61
L63      3  S L1-L18 AND L62
L64      5  S L1-L18 AND L49
L65      2  S L64 NOT L63
L66      1  S L65 NOT 9/SC
L67      4  S L63, L66

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FILE 'REGISTRY' ENTERED AT 15:02:57 ON 01 NOV 2007

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           E STAINLESSS STEEL/CN
           E STAINLESS STEEL/CN
L68      1  S E3
L69      108  S STAINLESS STEEL
L70      108  S STAINLESS(L)STEEL

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FILE 'HCAPLUS' ENTERED AT 15:03:43 ON 01 NOV 2007

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L71      153  S L49 AND L68-L70
L72      164  S L49 AND STAINLESS(L)STEEL
L73      197  S L71, L72
L74      31  S L73 AND PY<=2003 NOT P/DT
L75      113  S L73 AND (PD<=20030715 OR PRD<=20030715 OR AD<=20030715) AND P
L76      144  S L74, L75
L77      24  S L76 AND L62
L78      2  S L77 AND (?POROUS? OR ?POROS? OR PORE?)
L79      22  S L77 NOT L67, L78
           SEL AN 9-13 15-18 20
L80      10  S L79 AND E1-E20
L81      22  S L76 AND (?POROUS? OR ?POROS? OR PORE?)
L82      20  S L81 NOT L78
           SEL AN 1 2 3 5 11
L83      5  S L82 AND E21-E30
L84      100  S L76 NOT L78-L83
L85      53  S L73 NOT L76-L84
           SEL AN 4 40
L86      2  S L85 AND E31-E34
L87      23  S L67, L78, L80, L83, L86
L88      23  S L87 AND L1-L27, L36-L67, L71-L87
L89      23  S L88 AND (?DEPOS? OR ?PLAT? OR ?COAT? OR SUBSTRATE OR SURFAC?
L90      8  S L89 AND ?CONDUCT?
L91      12  S L89 AND POLY?/CW, CT
L92      18  S L89-L91 AND (H01M/IPC, IC, ICM, ICS OR FUEL CELL OR ELECTR? CELL
L93      23  S L89-L92

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FILE 'HCAPLUS' ENTERED AT 15:42:22 ON 01 NOV 2007

FILE 'WPIX' ENTERED AT 15:43:11 ON 01 NOV 2007

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L94      54561  S C25D/IPC, IC, ICM, ICS
L95      4879  S X25-R04/MC
L96      3613  S N?056/PLE
L97      1158  S N?125/PLE

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L98      34161 S ?ELECTRODEPOS? OR ?ELECTROPLAT? OR ?ELECTROCOAT?
L99      30787 S (?ELECTROPHOR? OR ?ELECTROLY?) (S) {DEPOS? OR COAT? OR PAINT?}
L100     94712 S L94-L99
L101     85785 S L100 AND (PD<=20030715 OR PRD<=20030715 OR AD<=20030715)
L102     133 S L101 AND (NAFION OR FLEMION# OR DOW (S) XUS)
          E NAFION/CN
          E FLEMION/CN
          E XUS/CN
L103     128 S L101 AND (F62(S)F)/PLE
L104     106 S L101 AND IONOMER?
L105     82 S L101 AND P0588/PLE
L106     315 S L102-L105
L107     29 S L106 AND STAINLESS(L)STEEL
          E STAINLESS STEEL/CN
          E STEEL/CN
L108     0 S L106 AND G3189/PLE
L109     11 S L107 AND POROUS
          SEL AN 6
L110     1 S L109 AND E1
L111     1 S L1
L112     1 S L111 AND L94-L110
L113     1659 S L101 AND ?POLYMER?(3A)?ELECTROLYT?
L114     108 S L113 AND L106
L115     33 S L114 AND (?POROUS? OR ?POROS? OR PORE?)
L116     31 S L115 NOT L107
L117     23 S L116 AND ?POLYM? ?ELECTROLYT?
L118     10 S L115 NOT L117
L119     7 S L117 AND POROUS?/TI
L120     16 S L117 NOT L119
          SEL AN 2 8 10 12
L121     12 S L120 NOT E2-E5
L122     20 S L110, L111, L112, L119, L121
L123     10 S L109 NOT L122
L124     18 S L107 NOT L109, L119
L125     20 S L122 AND L94-L124
L126     20 S L125 AND ?ELECTRO?
L127     20 S L126 AND ?POLYM?
L128     20 S L126 AND ?POLY?
L129     18 S L126 AND (?FLUOR? OR ?SULF? OR ?SULPH?)
L130     20 S L126 AND (?COAT? OR ?DEPOS? OR SUBSTRATE OR SURFAC? OR STEEL
L131     20 S L122, L125-L130

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FILE 'WPIX' ENTERED AT 16:06:44 ON 01 NOV 2007